WAVES OF DEVELOPMENT:

THE INFLUENCE OF SURF TOURISM ON COASTAL BALI

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To my family and friends -

thank you for all of the support and

words of encouragement on this journey.

I love you!

I. Abstract

Surfers travel around the world in search of perfect waves. Oftentimes this quest leads them to remote areas in developing nations. Over time these places become more popular and the development related to tourism follows.

While it may seem like a straightforward economic activity, tourism is a complex interaction that involves groups that have differing and often conflicting goals. The stakeholders include the local community, tourists, private sector businesses, tourist organizations, governments, non-profit organizations and international organizations. The type and scale of development that is appropriate depends on many factors that are unique to each place. Decisions about the construction, location and operations determine a project's impact on the local community and the environment.

This research analyzes the impact surf tourism has had on the coastal development in Bali, Indonesia including infrastructure, building and environmental impacts. As a result, I designed accommodations for traveling surfers that enhance the positive aspects of tourism while mitigating the negative impacts. The accommodations were designed so that a community could build the structures using locally sourced materials and labor, thereby, adding support to the Balinese economy. The project used passive strategies to reduce the demands on natural resources and is as self-sufficient as possible. I believe that an environmentally sensitive, architecturally and culturally appropriate design that benefits the community can be realized.

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IV. Chapter 1. Introduction

A. Project Context

This research focuses on the island of Bali in Indonesia. The island of Bali is already quite developed in certain regions with the largest concentration on the south side of the island; however, this may be the reason it is the best location for new development. The ethical issues raised through my research have brought into question the wisdom of building in a remote area that would require infrastructure improvements, destroy habitat and impact the local community. Keeping tourism contained in areas that have already been developed may be the best choice for future development on Bali.

Bali has been a popular destination among surfers for decades. There are already a number of resorts catering to surf tourists but their sustainable practices are questionable. The accommodations targeting eco tourists are in the forested interior areas of the island, as well as on the coast. Another option for tourists is the home stay which brings up its own ethical concerns outlined in the Community Based Tourism section of the Literature Review.

One of the main issues with any development is the fact that resources are consumed faster than they can be replaced. Additionally, compensation for this loss is rarely realized by those most impacted by it. Large scale development is often funded by large multinational companies that take the profits out of the country. They also tend to hire locals only for the low paying jobs. My project proposes a design which can be executed by the local community thereby keeping jobs, income and control in the hands of the Indonesians.

B. Goals

My goal is to motivate surfers and tourists to think critically about their impact when traveling. Tourists can use their buying power to support businesses

that are making positive contributions to the local community and the environment. My research demonstrates that surf tourism needs further study because, as a group, surfers travel to some of the most vulnerable places in the world and thus have a direct impact on the economy and development of those areas. At the same time people in less developed areas must take a long term approach and prevent their country or island from developing in an unsustainable way.

Persuading landowners and decision makers to consider different approaches to development will reduce the impact on the people, culture, environment and infrastructure. This research informs about the effects of tourism development on Bali in order to encourage responsible decision making for future development projects. I am providing a framework for development that is an alternative to current standard practices in the hospitality industry in Bali which largely ignore sustainable practices. Planned development can provide income without compromising the things that make Bali special.

C. Research Questions

Have surf tourists affected Bali's coastal development? Surfers have been visiting Bali for over seventy years.[1] This is a sufficient amount of time to see the changes that have taken place on the island. While there are no statistics tracking how many people visit Bali with the primary purpose of surfing, the sport has become popular enough to warrant research into this group's effect on the coastal development in Bali.

How has coastal development on Bali affected the environment? The demand for fresh water and natural resources has often necessitated taking these resources from other inland areas. Habitat has been destroyed by development. Land that previously functioned as a natural filtration system has been altered and thus can no longer perform that function. Pollution has further degraded the air, earth and water. Research into developing a way to build in a coastal region that can accommodate tourists while at the same time preserving habitat and reducing pollution is essential, especially on an island.

[1] Leonard Lueras, and Lorca Lueras, *Surfing Indonesia*, (Singapore: Periplus Editions (HK) Ltd, 2002), 37.

D. Hypothesis

Surf tourists have had a significant impact on the coastal development on Bali. Kuta, the area with the most development, had been frequented by surfers from around the world long before surfing's popularity grew into mass tourism. The first hotel on Kuta beach, The Kuta Beach Hotel, was started by American surfer Robert Koke and his wife Louise in the 1930's.[2] One of the reasons the Koke's chose that particular site was the proximity to good waves.[3] Surfing was not the prime reason tourists were visiting at that time but it did grow in popularity. The Koke's taught the local Balinese and their clientele how to surf; many of whom were unlikely surfers.[4]

The first large influx of tourists traveling to Bali specifically to surf came in the 1960's from Australia.[5] Word of mouth spread quickly in Australia touting Bali's great surf and relatively cheap prices.[6] The rest of the world's surfers were introduced to Bali's high quality waves in the 1970's through surf centric magazines and movies.[7] According to "Surfing Indonesia", surfers, and the resulting industry that supplies them, have transformed Kuta, making surfing a large commercial enterprise for Bali.[8]

E. Assumptions

My research and outcome are based on several assumptions. The assumptions stem from my upbringing, background, life experiences, ideological standpoint and the necessity to narrow down my research.

I was raised in The United States of America and as such have many associated beliefs. Since I have lived in a democracy my entire life there are certain

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[2] Leonard Lueras, and Lorca Lueras, *Surfing Indonesia* (Singapore: Periplus Editions (HK) Ltd, 2002), 37.
[3] Ibid., 37, 52.
[4] Ibid., 38, 52.
[5] Ibid., 38.
[6] Antonia Hussey, "Resources for Development: Tourism and Small Scale Indigenous Enterprise in Bali" (PhD diss., The University of Hawaii, 1986), 68.
[7] "Bali," *Surfline*, accessed September 23, 2013, http://www.surfline.com/travel/index.cfm?id=2169.
[8] Lueras, *Surfing Indonesia*, 44-45.

rights that I believe are universal. I believe people should have the power to choose their government, way of making a living and where they want to live. Since Indonesia is a democratic republic[9] I must presume that the average person also believes that the population should have some degree of control over the government and their own lives.

After reading and traveling I have observed that people are more motivated and supportive of a project or concept if they feel it originates with them, benefits them, and allows them control over decision making. Extending this to development, projects that put power in the hands of the local community are more successful because people have a vested interest in making decisions that positively impact their community and resources.

Living in a capitalistic economy also colors my outlook. I assume that the forces of supply and demand function in much the same way in Bali as they do in the USA since Indonesia has a market-based economy.[10] Of course there are many regulations in Indonesia pertaining to land development,[11] as there are in the USA, which impact both supply and demand. Nevertheless, I believe that the pull between supply and demand has affected and will continue to affect the scale and location of development in Bali.

Capitalism also breeds the idea that people are motivated by the desire to make money. Making a living in such a system either eliminates or greatly diminishes bartering or sharing. Most people in the USA do not grow their own food, or are not entirely self-sufficient making money essential for survival. So, while altruism is praise worthy, I believe that one's basic needs must be met first. Development that is sustainable or low impact must be economically attractive to the Balinese. The benefits need to be realized in both the short and long term.

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[9] "Indonesian Political System," *Embassy of Indonesia Athens*, accessed October 1, 2013, http://indonesia.gr/indonesian-political-system.
[10] "US Relations With Indonesia Factsheet," U.S. Department of State, accessed October 1, 2013, http://www.state.gov/r/pa/ei/bgn/2748.htm.
[11] "Doing Business in Indonesia 2012," *The World Bank and International Finance Corporation* (2012): 7, accessed October 2, 2013, http://www.doingbusiness.org/~/media/FPDKM/Doing%20Business/Documents/Subnational-Reports/DB12-Indonesia.pdf.

I have surfed for over half my life in Hawaii which brings another set of biases. As a surfer in the USA, I believe that people have the right to surf anywhere for free, as long as they are respectful. Hawaii State law mandates that the public has the right to access the beaches and shoreline.[12] This is not the case in many nations, especially in the Pacific region. While the idea of paying to surf seems quite odd to the average American surfer, in other countries the reef fronting a village is owned by that community.[13] Therefore, paying to surf a particular area would be equivalent to paying for lodging or food in that culture.

F. Scope

There are many important factors when analyzing tourism development. This research focuses on the impact that surf tourism has on coastal development. It touches on land usage, building and the historic patterns of development on Bali. Another major factor is the environmental cost. The research analyses how tourism development affects natural resources. Increased demand for build-able land and finite resources puts pressure on the natural resources and infrastructure which may not be able to support uncontrolled large scale development in the long run.

This research looks at surfers and the surfing culture. It covers surf tourists who travel to surf for recreation, not as spectators, and not as professional competitors. While these last two groups do surely contribute to surf tourism their motivations for traveling to a certain destination differ from those of the recreational surf tourist. Gender issues and the ability to travel will not be addressed although there is a need for further research. The economic challenges related to travel for international surf tourists will not be studied here either.

Tourism development always requires money. Whether it is a large scale resort complex or a small restaurant, there is a need for capital. This is an important factor that has a huge effect on what gets built and where. The regulations

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[12] "Public Access Rights," *Sea Grant - University of Hawaii*, accessed October 4, 2013, http://seagrant.soest.hawaii.edu/public-access-rights.
[13] Ralf Buckley, "Surf Tourism and Sustainable Development in Indo-Pacific Islands," *The Journal of Sustainable Tourism,* Vol. 10, No. 5 (2002): 415, accessed March 9, 2013, http://www98.griffith.edu.au/dspace/bitstream/handle/10072/6732/19530.pdf?sequence=1.

pertaining to location and the nature of development, as well as who profits from it are unique to each country. There is also the reality that people do not always follow the laws and corruption is a major issue in many developing countries. While this is very influential, the political issues regarding the fairness of laws, development and tourism policies will not be addressed here.

Another consideration is the impact that both the tourists themselves and the development have on the culture of a place. This brings up ethical issues about changing a culture, which has no clear cut answers and is continuously debated. Ethical issues are briefly discussed in the literature review. The Balinese have a strong cultural identity that is distinct from the rest of Indonesia. Hinduism plays a large part in their everyday lives. According to Eko Budihardjo, an Indonesian architect and professor,

> the Balinese are highly creative and innovative in the acculturation process, i.e. blending the outer influence into their own culture. One of the reasons is that they strongly hold and practice a dynamic concept of "*Desa-Kala-Patra*", meaning Space-Time-Situation, or Place-Period-Condition, which is so flexible that they can continuously adapt foreign elements without fear of losing Balinese identity.[14]

There have been many studies analyzing the effects that tourism has had on Bali's culture. Some people, like Dr. Budihardjo, believe that the culture is resilient while others fear that it is changing. Tourism development will continue on Bali and how it impacts the culture is an important topic beyond the scope of this research.

[14] Eko Budihardjo, *Architectural Conservation in Bali* (Yogyakarta, Indonesia: Gadjah Mada University Press, 1986), 31.

V. Chapter 2. Literature Review

A. Tourism Cycle

One of the most commonly cited models for the stages of tourism is R.W. Butler's Tourist Area Cycle of Evolution (see Figure 1). It is based on the cycle that all products go through: slow sales at first, rapid growth, stabilization, then decline.[15] The curve does show, however, that there is an opportunity in a mature market for continued growth. The governing factors influencing the model relate to accessibility and infrastructure. The tourists' desire for the level of adventure and amenities, as well as crowds, varies and dictates at what point in the cycle they visit a place. One of the things I found interesting about this model is the idea that human behavior and desires are so predictable. It assumes that people will get bored of certain destinations unless they are repackaged or reinvented in some way.

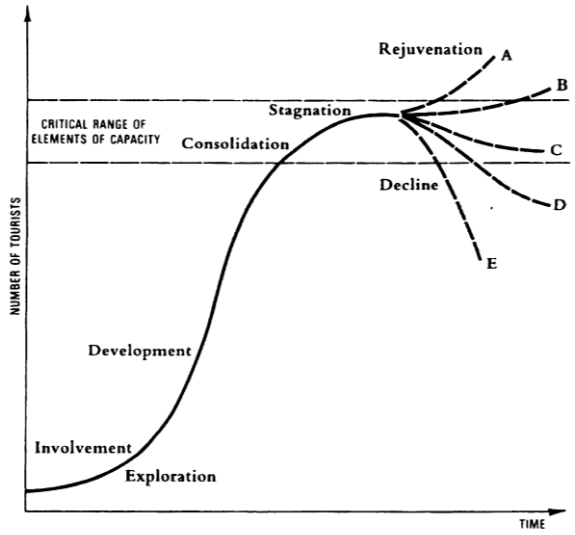

Figure 1. Hypothetical Evolution of a Tourist Area (Reproduced from Butler (1980, fig. 1))

[15] R.W. Butler, "The Concept of a Tourist Area Cycle of Evolution: Implications for Management of Resources," *The Canadian Geographer / Le Géographe canadien*, 24 (1980): 6-7, accessed March 23, 2013, http://aaronluman.com/articles/CycleOfEvolution.pdf.

There are people who question the validity of Butler's model. Dexter J.L. Choy questions its universal application noting that it doesn't hold when applied to all Pacific islands. He analyzed the tourist cycle in Pacific islands that receive both a high and low volume of tourists. Choy points out that the product life cycle assumes the product is not changing much while a tourist destination is changing in response to increased visitors.[16] Choy writes in "Life Cycle Models for Pacific Island Destinations" that Butler's model "can be misleading, in the case of Pacific island destinations. Rather than using Butler's model to describe the evolution of a tourist destination, it is better to treat each destination individually as a unique entity and not be preconditioned in conceptualizing alternative future growth patterns."[17]

A further criticism to using Butler's model is brought up by Casasnovas and Rosselló. It may apply to an area when the economy is stable but doesn't take into account the impact of turbulence in the world economy or in the countries that provide the tourists.[18] If, for example, most tourists for a certain area come from the USA and oil prices jump, the cost of airfare and everyday expenses may become prohibitive. Thus the tourism cycle curve would be interrupted.

B. Quantification

The concept of carrying capacity is important in the planning and management of tourist development. The idea in terms of tourism is that there are a maximum number of visitors and activities that an area can withstand before permanent damage is done to the environment or the recreational experience is degraded for tourists.[19] Coming up with a realistic number, however, is a challenge

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[16] Dexter J.L. Choy, "Life Cycle Models for Pacific Island Destinations," *Journal of Travel Research,* Vol. 30, No. 3 (1992): 29, accessed April 6, 2013, http://www.sagepub.com/clow/study/articles/PDFs/05_Choy.pdf.
[17] Ibid., 31.
[18] Antonio Alcover Casasnovas and Andreu Sansó Rosselló, "The tourist area lifecycle and the unit roots test. A new economic perspective for a classic paradigm in tourism," *DEA Working Papers 38,* Universitat de les Illes Balears, Departament d'Economía Aplicada (2009): 5-6, accessed April 6, 2013, http://ideas.repec.org/p/ubi/deawps/38.html.
[19] Harry Coccossis and Apostolos Parpairis, "Tourism and the Environment: Some Observations on the Concept of Carrying Capacity," in *Tourism and the Environment Regional, Economic, Cultural and Policy Issues*, ed. Helen Briassoulis and Jan van der Straaten (Dordrecht, the Netherlands: Kluwer Academic Publishers, 2000), 96.

because there are factors that are difficult to quantify. There are a number of different approaches to determine the carrying capacity but no one perfect model.

A further attempt to quantify difficult aspects of tourism relates to the economic value of nature. There are values related to how an area could be used and those related to leaving it unused.[20] Jan Van der Straaten examines two different methods to determine a value but acknowledges their inherent flaws.[21] He concludes that it is hard to determine because there is no monetary point of reference; "many of their elements are not traded in markets."[22]

Changing forms of tourism bring up the issue of what constitutes a resource for tourism. Paris Tsartas contends that traditionally the main 'tourist resources' were the environment, culture and infrastructure, however that definition is broadening.[23] The demand for a different experience than the traditional mass tourism model of sitting on a beach sipping fruity cocktails has influenced the tourist destinations. Butcher makes the observation that the 'New Moral Tourist' is expecting enlightenment from their interaction with the host culture believing that it is not possible to get this from a superficial developed society.[24] Thus the culture and traditional way of life is seen as a 'tourist resource' that needs to be managed and can produce income.[25]

Environmental Impact Assessments (EIA) are used to identify and predict the impact a project will have on the environment and human well-being in an attempt to mitigate the negative effects.[26] While the intention is positive the actual execution

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[20] Jan Van Der Straaten, "The Economic Value of Nature," in *Tourism and the Environment Regional, Economic, Cultural and Policy Issues*, ed. Helen Briassoulis and Jan van der Straaten (Dordrecht, The Netherlands: Kluwer Academic Publishers, 2000), 124.
[21] Ibid., 125-131.
[22] Ibid., 130.
[23] Paris Tsartas, "Environmental and Cultural Tourism Resources: Problems and Implications for Their Management," in *Tourism and the Environment Regional, Economic, Cultural and Policy Issues*, ed. Helen Briassoulis and Jan van der Straaten (Dordrecht, The Netherlands: Kluwer Academic Publishers, 2000), 214.
[24] Jim Butcher, *The Moralisation of Tourism Sun, Sand…and Saving the World?* (London, England: Routledge, 2003), 29-30.
[25] Tsartas, "Environmental and Cultural Tourism," 214, 216.
[26] Patricia Simpson and Geoffrey Wall, "Environmental Impact Assessment for Tourism: a Discussion and an Indonesian Example," in *Contemporary Issues in*

is often flawed. One of the criticisms mentioned by Simpson and Wall is that it focuses too much on the physical environment and not on the culture.[27] They also write that EIAs don't usually look at the cumulative impact, concentrating solely on the direct effects.[28] Another disconnect between the ideal and reality is that EIAs are often not done in a timely manner. Simpson and Wall use an example of a project in Indonesia, where EIAs are required by law, that didn't finalize its EIA until after the hotel opened.[29]

C. Ethical Issues

One of the major issues in tourism involves the ethics of influencing or changing a culture, especially that of indigenous people. The assumption that is being questioned at the foundation of the debate is that indigenous cultures should remain the same. Jim Butcher writes, in his book *The Moralisation of Tourism,* that "culture becomes objectified […] preserved for the sensibilities of the tourist, rather than being made and remade in the context of social change."[30] He contends that the indigenous culture's way of life is not a choice to shun consumerism but the product of the reality of surviving in a poorer country. [31] Brian Wheeller makes a similar critique in "Ecotourism/Egotourism and Development" when he points out that people in developed nations want to keep other societies unchanged while we enjoy the benefits of growth.[32]

While there are many in the tourism industry who oppose influencing the indigenous cultures through contact, exchanges of money or goods and development, there is a double standard. They advocate for the politically correct decision to avoid traveling to certain countries with opposing ideological or political

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Tourism Development, ed. Douglas G. Pearce and Richard W. Butler (London, England: Routledge, 1999), 233.
[27] Ibid., 233.
[28] Ibid., 234.
[29] Ibid., 248.
[30] Jim Butcher, *The Moralisation of Tourism Sun, Sand…and Saving the World?* (London, England: Routledge, 2003), 93.
[31] Ibid., 94.
[32] Brian Wheeller, "Ecotourism/Egotourism and Development," in *Nature-Based Tourism in Peripheral Areas Development or Disaster?*, ed. C. Michael Hall and Stephen Boyd (Buffalo, NY: Channel View Publications, 2005), 266.

views to their own. Thus, as Wheeller brings up, the act of withholding income from those countries is an attempt to change them.[33]

Another underlying assumption in this debate is the positive relationship of indigenous people/culture to the land. Butcher contends that these communities are seen by the 'New Moral Tourism' as protecting the natural environment and that their lifestyle is more sustainable.[34] He questions why certain groups of people should be encouraged to keep their traditional relationship to the land.[35] This static view tends to limit the scope of what is possible in these communities. Part of the problem is tied to the projects being funded by outside groups. Butcher writes that "ecotourism development projects take the relationship as it exists and institutionalizes it through lines of funding from the developed world."[36]

D. Community Based Tourism

Community based tourism is a growing part of the ecotourism industry. It revolves around tourists staying in the homes of people in the local community, or sometimes in specially constructed buildings. These home stays are viewed as a way to meet the sustainability goals of both development and conservation.[37] One of the benefits is that income remains in the hands of the community instead of going to an international company running a resort. Sproule and Suhandi bring up the issue that these programs exclude disadvantaged members of the community who do not have space to accommodate tourists in their home or on their land, and do not have the income to build a guest house.[38] There are also issues associated with gender because women are restricted from doing certain activities in some communities thus

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[33] Brian Wheeller, "Ecotourism/Egotourism and Development," in *Nature-Based Tourism in Peripheral Areas Development or Disaster?*, ed. C. Michael Hall and Stephen Boyd (Buffalo, NY: Channel View Publications, 2005), 266.
[34] Jim Butcher, *The Moralisation of Tourism Sun, Sand…and Saving the World?* (London, England: Routledge, 2003), 28.
[35] Ibid., 117.
[36] Ibid., 129.
[37] Keith W. Sproule and Ary S. Suhandi, "Guidelines for Community-based Ecotourism Programs," in *Ecotourism A Guide for Planners and Managers Volume 2*, ed. Kreg Lindberg, Megan Epler Wood and David Engeldrum (North Bennington, VT: The Ecotourism Society, 1998), 215.
[38] Ibid., 216-217.

limiting the income they can bring in.[39] Another important consideration is that these arrangements can produce division in the community if it is not managed in a way that people believe is fair.[40]

An example in Indonesia brings up other issues with home stays. Wall and Long studied the Peliatan community on the island of Bali. They found that many of the owners needed to have another source of income because the home stays weren't sufficient to meet their needs.[41] The increased burden put on the family interfered with their participation in certain rituals which are performed by specific members of the family.[42] The home stays also altered the architecture and layout of the housing complex. The layout of a Balinese housing complex is very specifically related to cosmological ideas.[43] The layouts of these complexes were changed to accommodate the home stay guests, workers, restaurants, etc. thus changing this cosmological relationship.[44] These kinds of changes impact the community and culture.

Samoa has a unique community based tourism industry. They have not had as much large scale coastal development as some other Pacific island nations because of their traditional land tenure system.[45] Most of the desirable coastal land is held by local Samoan families who will not sell to developers.[46] The Samoan families built beach *fales*, which are essentially small structures without walls, as budget accommodations.[47] The type of tourist that stays in beach *fales* are not expecting

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[39] Keith W. Sproule and Ary S. Suhandi, "Guidelines for Community-based Ecotourism Programs," in *Ecotourism A Guide for Planners and Managers Volume 2*, ed. Kreg Lindberg, Megan Epler Wood and David Engeldrum (North Bennington, VT: The Ecotourism Society, 1998), 217.
[40] Ibid., 218.
[41] Geoffrey Wall and Veronica Long, "Balinese Homestays: An Indigenous Response to Tourism Opportunities," in *Tourism and Indigenous Peoples*, ed. Richard Butler and Tom Hinch (London, England: International Thomson Business Press, 1996), 40.
[42] Ibid., 40.
[43] Ibid., 42.
[44] Ibid., 43.
[45]Regina Scheyvens, "Growth of Beach *Fale* Tourism in Samoa: The High Value of Low-cost Tourism," in *Nature-Based Tourism in Peripheral Areas Development or Disaster?*, ed. C. Michael Hall and Stephen Boyd (Buffalo, NY: Channel View Publications, 2005), 191.
[46] Ibid., 190-191.
[47] Ibid., 193.

luxurious goods so the owners tend to buy goods and food locally, as well as using local service.[48]

The benefits of building beach *fale* accommodations are: the control and ownership stays in local hands, income is provided and, as Scheyvens notes, the villagers felt proud of their culture when tourists asked them about it.[49] Issues with beach *fale* development are problems with sewage disposal, safe drinking water, and restrictions placed on villager's access to the beaches.[50] Some people are concerned that if the Samoan government puts in place minimum standards it will force out small businesses.[51]

E. Mass Tourism vs. Eco Tourism

Ideas about sustainable or responsible tourism make certain assumptions that are being challenged. The first, according to Martin Mowforth et al., is that the 'natural environment' is crucial to tourism's success.[52] The problem with this is that there is no consensus on what the 'natural environment' includes.[53] Furthermore, they assert that tourists are attracted to areas where nature and human activity intersect, "invoking a sense of 'conquering' the barriers presented by 'Nature'."[54]

The second assumption that Mowforth et al. bring up is that tourism has a negative impact on the environment.[55] There is a long list of the ways that tourism can negatively impact the environment from increased water and energy consumption, destruction of habitat, pollution, etc. There is wide consensus that these are very real problems that need to be dealt with. The unique counter point of view regards mass tourism versus ecotourism. One would assume that ecotourism is

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[48] Regina Scheyvens, "Growth of Beach *Fale* Tourism in Samoa: The High Value of Low-cost Tourism," in *Nature-Based Tourism in Peripheral Areas Development or Disaster?*, ed. C. Michael Hall and Stephen Boyd (Buffalo, NY: Channel View Publications, 2005), 195.
[49] Ibid., 197-198.
[50] Ibid., 199.
[51] Ibid., 201.
[52] Martin Mowforth, Clive Charlton, and Ian Munt, *Tourism and Responsibility Perspectives from Latin America and the Caribbean* (New York: Routledge, 2008), 101.
[53] Ibid., 102.
[54] Ibid., 104.
[55] Ibid., 105.

less harmful to the environment, but, Mowforth et al. bring up some reasons that mass tourism may in fact be better. Keeping tourists in an area that is already developed concentrates their activity which relieves the pressure on undeveloped areas.[56] Another advantage is that large resorts may have better sanitation facilities to dispose of waste.[57]

F. Surf Tourism

1. Origins of Surfing

Surfing has a long history among coastal people. It is theorized that surfing originated from a practical need to access fisheries that were beyond the waves and to bring this catch to shore quickly and efficiently.[58] As anyone who has ridden a wave can attest, the feeling of gliding on top of the water is very enjoyable so it would be a natural conclusion that these fishermen would "surf" their boats for fun as well.

Hawaii is often cited as the birthplace of surfing, however, the more accurate description is that it is the place where surfing standing up reached the height of development closest to modern surfing.[59] Historians Westwick and Neushul speculate that surfing was able to thrive in Hawaii because the Hawaiians had plentiful food supplies and shelter was easily constructed thus freeing up their time for leisure.[60]Ancient Hawaiians also had 4 months a year of leisure time because common work activities such as fishing and farming were forbidden during the *Makahiki* festival, which celebrated the harvest and the god *Lono*.[61]

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[56] Martin Mowforth, Clive Charlton, and Ian Munt, *Tourism and Responsibility Perspectives from Latin America and the Caribbean* (New York: Routledge, 2008), 128.
[57] Ibid., 127.
[58] "History of Surfing," *Surfing Heritage Foundation*, accessed October 10, 2013, http://files.surfingheritage.org/flash/timeline/.
[59] Ben Marcus, "From Polynesia, with Love: The History of Surfing From Captain Cook to the Present," *Surfing for Life*, accessed October 11, 2013, http://www.surfingforlife.com/history.html.
[60] Peter Westwick, and Peter Neushul, *The World in the Curl: An Unconventional History of Surfing* (New York: Crown Publishers, 2013), 12-13.
[61] "Makahiki," *HawaiiHistory.org*, accessed October 13, 2013, http://www.hawaiihistory.org/index.cfm?fuseaction=ig.page&PageID=534.

Surfing was not merely a leisure activity in ancient Hawaii; it had political, cultural, and spiritual significance. Surfing was a way for chiefs to demonstrate power and leadership skills.[62] It was also one of the few places that men and women could have contact due to the strict social regulation system governing interactions between the sexes.[63] The spiritual aspects of surfing were expressed in prayers for everything from cutting down the tree which would be carved into a surfboard to trying to elicit good waves.[64] The Hawaiians' close connection to the ocean waves is illustrated by the multiple meanings of the word *nalu*. *Nalu* is the word for waves or surf, to ponder or meditate, and amniotic fluid.[65] Clearly the Hawaiians' relationship to the ocean waves, and their interaction with it through surfing, was more than just superficial recreation.

Hawaiians are partly responsible for putting surfing into the collective psyche of the world. Captain Cook's historic visit to Hawaii in 1778 produced accounts and illustrations depicting surfing as an enjoyable pastime.[66] Early visitors from the USA and Europe were fascinated by the seemingly idyllic lifestyle of the Hawaiians. Famous authors such as Mark Twain[67] and Jack London,[68] who tried surfing while vacationing in Hawaii, wrote about their experiences. These accounts solidified a romanticized view of Hawaii and the surfing lifestyle.

It was also Hawaiians that brought worldwide attention to surfing. George Freeth and Duke Kahanamoku introduced surfing to the world by putting on demonstrations.[69] Freeth was hired to promote seaside resorts and a railway in

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[62] Peter Westwick, and Peter Neushul, *The World in the Curl: An Unconventional History of Surfing* (New York: Crown Publishers, 2013), 8.
[63] Ibid., 9.
[64] Ibid., 8.
[65] *Hawaiian Dictionary*, Revised and Enlarged Edition, s.v. "nalu."
[66] James Cook, and James King, *A Voyage to the Pacific Ocean* (London: W&A Strahan, 1784), 145-147, accessed October 20, 2013, http://archive.org/details/voyagetopacifico03cook.
[67] Lawrence Downes, "Mark Twain's Hawaii," *The New York Times*, May 14, 2006, accessed October 20, 2013, http://travel2.nytimes.com/2006/05/14/travel/14twain.html?_r=1&.
[68] "Surfing: The Royal Sport," *The World of Jack London*, accessed October 20, 2013, http://www.jacklondons.net/surfing2.html.
[69] Ben Marcus, "From Polynesia, with Love: The History of Surfing From Captain Cook to the Present," *Surfing for Life*, accessed October 11, 2013, http://www.surfingforlife.com/history.html.

California by surfing, which was supposed to show the visitors how much fun they could have in the ocean.[70] Kahanamoku was an Olympic swimmer who traveled throughout the world for swim exhibitions.[71] In locations that also had ridable waves, he surfed, attracting much attention and fanfare.[72] By all accounts Freeth and Kahanamoku both epitomized the best of the surfing lifestyle and spirit of aloha.[73] As a result of their actions, Hawaii is considered by many to be where the soul of surfing resides.

After Freeth and Kahanamoku's demonstrations, surfing became very popular in southern California. A surfing subculture evolved due to advancements in surfboard fabrication which made them lighter, cheaper and more readily available.[74] The 1950's and 60's were also saturated with surf films targeting teenagers as a new affluent consumer group. Many people credit (blame) the movie *Gidget* for the explosion in the popularity of surfing in California in 1960.[75]

2. Surfing and Travel

According to some estimates, as of 2012 there were 23 million surfers worldwide.[76] There is a growing surf tourism industry due to the fact that there are an increasing number of surfers in the world who can afford to travel, many of whom are older but don't have much time for a vacation.[77] The value of surf tourism is

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[70] Arthur C. Verges, "George Freeth: King of the Surfers and California's Forgotten Hero," *California History,* Vol. LXXX, No. 2/3 (2001): 82 -105, accessed October 14, 2013, http://files.legendarysurfers.com/surf/legends/ls05_freeth_verge2001.html.
[71] "Duke Kahanamoku," *Kahanamoku Sons, Inc*., accessed October 20, 2013, http://www.hawaiianswimboat.com/duke2.html.
[72] Ibid.
[73] Verges, "George Freeth: King," 82 -105.
[74] Joan Ormrod, "Endless Summer (1964): Consuming Waves and Surfing the Frontier," *Film & History: An Interdisciplinary Journal of Film and Television Studies,* vol. 35.1 (2005): 41, accessed October 04, 2013, doi: 10.1353/flm.2005.0022.
[75] Michael Alan Reed, "Waves of Commodification: A Critical Investigation Into Surfing Subculture." (MA Geography diss., San Diego State University, 1999), 28.
[76] "Surfing Statistics," *Statistic Brain*, accessed April 13, 2013, http://www.statisticbrain.com/surfing-statistics/.
[77] Ralf Buckley, "Surf Tourism and Sustainable Development in Indo-Pacific Islands," *The Journal of Sustainable Tourism,* Vol. 10, No. 5 (2002): 408, accessed March 9, 2013, http://www98.griffith.edu.au/dspace/bitstream/handle/10072/6732/19530.pdf?sequence=1.

estimated to be $7 billion per year, however, in an interview with KPBS Jess Ponting indicates that it could be worth as much as $14 billion.[78]

Surfing is inextricably linked to travel in the minds of surfers from the USA. If one browses any surf centered magazine or website it is filled with images and articles about surf destinations around the world. This compulsion to explore was always part of colonial Europe's identity of conquest. In the USA, it is epitomized by the push westward towards the Pacific Ocean and the drive to tame the wild. Many people attribute surfing's popularity to this desire. Joan Ormrod points out that "by the early 60s there were no more frontiers to conquer except space and the ocean. Surfers seemed to represent the frontiersmen conquering the final frontier to America."[79]It didn't take long for them to set their sights on conquering "new" frontiers in foreign places.

While *Gidget* influenced people to take to the water, it was another movie that influenced people to "search the world for that perfect wave that might be forming just over the horizon."[80] *The Endless Summer* influenced an entire generation of surfers. The release of *The Endless Summer* in 1964 coincided with increasing numbers of surfers crowding the lineups. This pressure on a limited resource lead to aggression which manifested in vandalism and physical violence.[81] The idea of a paradise in an exotic location with perfect, uncrowded waves was not new; but the ability of large numbers of people to actually travel to these destinations was.

For this study a surf tourist will follow Fluker's definition in which the surfer travels domestically for 6 months or less, or internationally for 12 months or less,

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[78] Erik Anderson, and Nicholas McVicker, "San Diego's Surfing Culture Catches an Academic Wave," KPBS, accessed October 13, 2013, http://www.kpbs.org/news/2011/oct/31/san-diegos-surfing-culture-rides-academic-wave/.
[79] Joan Ormrod, "Endless Summer (1964): Consuming Waves and Surfing the Frontier," *Film & History: An Interdisciplinary Journal of Film and Television Studies,* vol. 35.1 (2005): 43, accessed October 04, 2013, doi: 10.1353/flm.2005.0022.
[80] Ormrod, "Endless Summer (1964)," 41.
[81] Peter Westwick, and Peter Neushul, *The World in the Curl: An Unconventional History of Surfing* (New York: Crown Publishers, 2013), 194-195.

staying at least 1 night.[82] The person is actively participating in the sport of surfing and it is the primary reason for choosing that particular destination.[83] The surfer is someone who relies on the energy of the wave to move.[84] There are many forms of wave riding this could encompass but this study will focus on surfers who ride a surfboard standing up (not Stand Up Paddleboards), bodyboarders and bodysurfers who do not use any kind of board. This group will collectively be referred to as "surfers" throughout this paper.

A number of significant developments enabled surfers to travel to previously unthinkable areas. Advances in jet aircraft in the 1960's allowed surfers to travel farther and more easily.[85] Advances in surfboard manufacturing which changed from using wood to polyurethane foam made surfboards more readily available and cheaper;[86] as well as being smaller and lighter which made travel more realistic.[87] In the USA in the early 1960's more people had disposable income[88] which allowed surfers to pay for travel as well as all of the accompanying gear. Surf tourism was born.

Surfers have visited and influenced many parts of the world. Any coastline that has relatively unobstructed access to open ocean swells is fair game. Michael Alan Reed makes an interesting observation about surf tourism:

> Surfers, in their search for the perfect wave, have set up outposts all over the developing world. These tourist places suggest that surfing may be exemplary of the neocolonialism project, whereby control is exerted over the periphery

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[82] Sara Dolnicar, and Martin Fluker, "Who's Riding the Wave? An Investigation into Demographics and Psychographic Characteristics of Surf Tourists," *CAUTHE 2003: Riding the Wave of Tourism and Hospitality Research* (2003): 314, accessed October 13, 2013, http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1258&context=commpapers.
[83] Ibid., 314.
[84] Ibid., 314.
[85] Peter Westwick, and Peter Neushul, *The World in the Curl: An Unconventional History of Surfing* (New York: Crown Publishers, 2013), 203.
[86] Joan Ormrod, "Endless Summer (1964): Consuming Waves and Surfing the Frontier," *Film & History: An Interdisciplinary Journal of Film and Television Studies,* vol. 35.1 (2005): 41, accessed October 04, 2013, doi: 10.1353/flm.2005.0022.
[87] Westwick and Neushul, *The World in the Curl,* 203.
[88] Ormrod, "Endless Summer (1964)," 43.

> not by overt military actions but instead by means of economic and cultural invasion and persuasion.[89]

This type of influence is indicative of all tourism and is a contentious issue. Contact between cultures and the exchange of money, goods, services and ideas are inevitable with increasing globalization.

A significant event in the history of surf tourism was the founding of the first real surf camp in Grajagan, Indonesia. G-Land, as it is known to surfers, sits in the Alas Purwo National Park on the island of Java (see Figure 2). The waves were "discovered" by an American surfer, Bob Laverty, who saw them from his plane while flying to Bali.[90] A friend's brother, Mike Boyum, built a surf camp there within a few years, which opened in 1978.[91] These accommodations were built specifically for surfers and are an example of a direct cause and effect relationship between surfers and coastal development. After the original camp was built, a few others were also allowed to be built in this national park. The Indonesian government let tourism take priority over protecting this rainforest. Even after a tsunami leveled the camps in 1994,[92] they were rebuilt and remain an immensely popular surfing destination. As Westwick and Neushul explain:

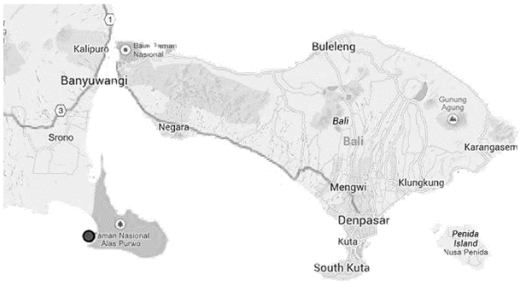

Figure 2. G-Land (Surfline.com)

> The G-Land complex marked the emergence of a new industry, surf tourism, designed to help surfers reach new waves. In the process, surfers crossed the line of that old distinction between travelers and tourists […] romantic counterculture gave way to commerce. By the 1980s and 1990s, all the baby boomers who had started surfing in the 1950s and 1960s were middle-aged and had no interest in roughing it, and they were willing and able to pay for amenities.[93]

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[89] Michael Alan Reed, "Waves of Commodification: A Critical Investigation Into Surfing Subculture." (MA Geography diss., San Diego State University, 1999), 5.
[90] Peter Westwick, and Peter Neushul, *The World in the Curl: An Unconventional History of Surfing* (New York: Crown Publishers, 2013), 204.
[91] Ibid., 204.
[92] "Surfers Ride "THE BIG ONE"," *USC Tsunami Research Center*, accessed December 10, 2013, http://www.usc.edu/dept/tsunamis/indonesia/java/tsusurf.html.
[93] Westwick and Neushul, *The World in the Curl*, 204-205.

G-Land became a model for accommodations tailored to surfers around the world. There are now surf camps for almost every level of budget, skill and preferential wave type.

The average surfer today is quite familiar with specific waves and conditions that are far from home, even if it has not been experienced first-hand. With advancements in GPS and ocean monitoring devices surf forecasting has become a layman's science. Surfers now have the ability to predict when a swell will hit a certain region and its size 14 days ahead of time. Technology even allows surfers to create a custom forecast for anywhere in the world.[94]The combination of repeated exposure to images of excellent waves in foreign destinations and the forecasting tools, convince surfers that there are perfect waves to be ridden if they are willing and able to leave home.

Some of the most popular surf destinations are small reef fringed islands. Conflicts arise because reefs and beaches are owned by the nearest village in many Indo-Pacific island nations.[95] Therefore visitors must get permission to surf certain breaks, which is a foreign concept to surfers from countries with a European history.[96] There are also environmental stresses of increased demand for fresh water, pollution and eutrophication of reefs from sewage discharge.[97] Additionally tourism can drive up the prices of resources to the point where locals cannot afford them anymore.[98]

3. Surf Tourist Profile and Preferences

When someone mentions the word surfer, a defined set of stereotypes springs to mind. Usually it's a young, Caucasian, fit, heterosexual male with long sun bleached hair who wears board shorts and slippers (flip flops) all the time. He

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[94] "Create Your Own Custom Forecast," *Surfline*, accessed October 4, 2013, http://www.surfline.com/surfline/forecasts4/forecast_vbgst.cfm.
[95] Ralf Buckley, "Surf Tourism and Sustainable Development in Indo-Pacific Islands," *The Journal of Sustainable Tourism,* Vol. 10, No. 5 (2002): 415, accessed March 9, 2013, http://www98.griffith.edu.au/dspace/bitstream/handle/10072/6732/19530.pdf?sequence=1.
[96] Ibid., 421.
[97] Ibid., 419.
[98] Ibid., 420.

doesn't have a job, is totally irresponsible and lazy. He fills his time with surfing and smoking marijuana. He is only interested in, and thus can only talk about, three things: surfing, girls, and partying. Somehow, despite the lack of a job, he has a car and a collection of new surfboards and goes on surf trips regularly. To some he is a counter culture hero, who doesn't conform to the norms of society. To others, he is a drain on society, who wastes his life pursuing the perfect wave.

This stereotype has been perpetuated in the media for decades. While there are some people who fit this stereotype, it is useful to look at some survey data. Surfrider Foundation conducted a survey of 5,360 surfers (including bodyboarders and bodysurfers) in the USA between the ages of 13 and 85.[99] In this sample group they found that the average surfer is a 34 year old male with a college degree and full time employment making $75,000 per year.[100] They estimate that all of the surfers in the US collectively put between $2 billion and $5 billion into the US economy every year.[101] This sum does not include surf travel outside the USA. It is noted that the data is not random since it was collected by an internet opt-in survey; therefore it is not sufficient to make inferences about the larger US surfing population.

Collecting demographic, travel, and surf preference data from a large number of surfers is a challenge. Surfers are spread out geographically and don't have one consistent location that they visit except their favorite surf spot. The internet provides more opportunity; however, it is biased towards those people who have access to technology. There are also a wide variety of websites that surfers visit. One could surmise that the only common thread is the surf report or surf forecasting websites. Again this would be a biased sample group since different people prefer certain websites to suit their needs. There are also region specific surf forecasting websites such as Surf News Network in Hawaii which is most likely visited by local surfers or those coming to Hawaii on vacation.

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[99] G. Scott Wagner, Chad Nelsen, and Matt Walker, "A Socioeconomic and Recreational Profile of Surfers in the United States," *Surfrider Foundation*, accessed October 20, 2013, http://www.surfrider.org/images/uploads/publications/surfrider_report_v13(1).pdf.
[100] Ibid.
[101] Ibid.

Another challenge to sampling surfers is the great variety in demographics. Surfing cuts across all types of classifications such as gender, age, race, economic status, profession and religion. It is practiced in almost every coastal country. There have been small scale and very specific studies on surfer demographics but these are not sufficient to extrapolate information that can apply to the group as a whole.

There is a lack of empirical data available about surfers and surf tourism since it has not been studied in a scientific manner until recently. Studies such as the Surfrider Foundation survey give limited data about the demographic and economic characteristics of surfers themselves. Another internet survey conducted by the Surf Travel Company got 430 respondents.[102] This survey is part of an unpublished report designed by Jess Ponting as part of the requirements to get a Master of Management (Tourism Management) from The University of Technology in Sydney, Australia.[103]The survey data is limited because the company is Australian based and would only sample those surfers who use an organized surf tour operator. There are many surfers who prefer to make their travel arrangements independently, favoring the flexibility. Thus this survey only captures a narrowly defined type of surf tourist.

The Australian surf tourist, however, is relevant to this examination because Australians make up the third largest group of tourists to Indonesia, after Singapore and Malaysia (as of 2011).[104] Surfing is not a popular pastime in Singapore and Malaysia so the number of surf tourists from these countries is probably small. Australians, on the other hand, have embraced surfing as a national sport.

Ponting's survey data was also used to characterize surfers based on their past surf travel destinations. Dolnicar and Fluker broke the data into 6 segments. One segment (B1) heavily favored travel to Indonesia and comprised 10% of the

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[102] Sara Dolnicar, and Martin Fluker, "Who's Riding the Wave? An Investigation into Demographics and Psychographic Characteristics of Surf Tourists," *CAUTHE 2003: Riding the Wave of Tourism and Hospitality Research* (Lismore, NSW: Southern Cross University, 2003) 316, accessed October 13, 2013, http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1258&context=commpapers.

[103] Jess Ponting, "Consuming Nirvana: An Exploration of Surfing Tourist Space" (PhD Thesis, University of Technology, Sydney, 2008), 360.

[104]"Statistik Indonesia 2012," *Badan Pusat Statistik*: 330, accessed October 18, 2013, http://www.bps.go.id/eng/hasil_publikasi/si_2012/index3.php?pub=Statistik%20Indonesia%202012.

respondents.[105]They had an average age of 27 and most (26%) have been surfing for 6-10 years.[106] This group characterized themselves as mostly intermediate surfers (47%) who prefer challenging hollow waves.[107]Indonesia has many waves that meet this criterion; therefore, it is a sensible conclusion that surf tourists favoring this wave type would choose it as a destination.

The segment (B1) favoring Indonesia had interesting travel preferences. More than half of segment B1 surfers stayed at their vacation destination 2-4 weeks, which was longer than the majority in the other segments.[108] The other surfer segments mostly stayed less than 2 weeks.[109] This could be due to a number of factors such as time off work, income, the destination's relative price and proximity to home. 40% of these surfers indicated that they travel for surf regularly, more than once per year, and 79% of them prefer to move through a variety of areas as opposed to staying in one area.[110] When taking into account the length of time for each surf trip and regularity of travel, this is a significant investment of their time and money devoted to surf tourism.

An important result from the Ponting survey related to surf travel is the ranking of the importance of novelty in a surf destination. Most of the respondents (48%) from the entire sample group prefer to travel to a new country with new surf breaks.[111] The other options were traveling to a familiar country with new surf breaks or returning to a favorite spot which were preferred by 24% and 28% of respondents, respectively.[112]One can conclude that this particular group of surfers would continue to seek out new surf destinations as is consistent with the quest to

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[105] Sara Dolnicar, and Martin Fluker, "Behavioural Market Segments Among Surf Tourists – Investigating Past Destination Choice," *The Journal of Sport Tourism*, Vol. 8, Issue 3 (2003): 191, accessed October 11, 2013, http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1046&context=commpapers.
[106] Ibid., 196.
[107] Ibid., 196.
[108] Ibid., 196.
[109] Ibid., 196.
[110] Ibid., 196.
[111] Sara Dolnicar, and Martin Fluker, "Who's Riding the Wave? An Investigation into Demographics and Psychographic Characteristics of Surf Tourists," *CAUTHE 2003: Riding the Wave of Tourism and Hospitality Research* (Lismore, NSW: Southern Cross University, 2003), 324, accessed October 13, 2013, http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1258&context=commpapers.
[112] Ibid., 324.

explore new "frontiers". Even if a surfer finds an excellent wave there is always the idea that another spot could be even better and less crowded. This never ending search fuels the surf tourism industry and will continue to expand it in both geographic and economic scope.

Another indicator of what criteria surfers use to choose a surf trip location is revealed by Ponting's psychographic variables. 72% of the respondents thought lack of crowds was important.[113] Personal safety, the quality of the natural environment and health concerns were also ranked high by the majority of respondents. [114]All of these preferences play into the ideal of a tropical paradise with perfect, uncrowded waves, friendly locals and clean water. This is the image propagated by marketing in many surf destinations around the world; however, the reality may not live up to the hype.

This research project attempts to expand the knowledge about surf tourism's demographics, preferences and habits. A survey of surf tourists both on the ground in Bali and online gives some insight into this special tourist group. As addressed previously, surf tourists are difficult to sample for many reasons and therefore, I believe worthy of further study.

[113] Sara Dolnicar, and Martin Fluker, "Who's Riding the Wave? An Investigation into Demographics and Psychographic Characteristics of Surf Tourists," *CAUTHE 2003: Riding the Wave of Tourism and Hospitality Research* (Lismore, NSW: Southern Cross University, 2003), 324, accessed October 13, 2013, http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1258&context=commpapers.
[114] Ibid., 324.

VI. Chapter 3. Research

A. Research Methods

1. Interpretive-Historical

Data was collected through archives and records, historic photographs, paintings/ sketches, maps, the local and national tourist associations, newspapers, Environmental Impact Assessments (EIA), old and new surf magazines, GIS applications, the internet, surveys and interviews. Background information was collected on the selected case studies including historical and cultural context, physical characteristics and environmental factors.

2. Qualitative

The qualitative portion was accomplished through surveys and informal interviews on Bali. These were conducted in person on the ground in Bali, Indonesia to ensure data integrity (i.e. people who actually surf and traveled to Bali, people who live in Bali) by way of choosing appropriate subjects (i.e. no people identified as part of a vulnerable group). Internet based surveys are less reliable because they are more susceptible to integrity issues as well as limiting the subject pool to people who have access to the internet. The surveys were given on the beach fronting popular surf breaks. The research collected both qualitative and quantitative data. The survey did not collect any personally identifiable information. Limited demographic data was collected and reported in a range to ensure the data is not personally identifiable. The survey had 17 multiple choice questions with 3 open ended fill in the blank questions. The survey consent forms and questions were translated into the native languages of the four largest groups of tourists to visit Bali as of 2013 (Australia, China, Japan, and Malaysia). The surveys were given to women and men that I observed surfing in Bali who were at least 18 years of age and who do not reside on Bali. I anticipated between 50-75 participants; 61 were collected. A paper survey was given to each person once and upon completion the survey was returned to me. After completing these paper surveys I determined the need for a larger pool of participants. I conducted online surveys recruiting surfers

on various surf related websites. I anticipated 100 participants and got 113 people who completed the entire survey and did not self identify as part of a vulnerable group.

Informal interviews were conducted with surfers, tourists, business owners, expatriates living in Bali and people employed in the tourist industry. These interactions provided information about the tourist industry in general, tourists' perceptions, Indonesians' perceptions, and the building process.

3. Case Studies

I have chosen to focus my case studies on Bintan Island, Indonesia, New Ireland, Papua New Guinea, and various hotels in the tropics. These locations have varying degrees of contact with surf tourists. Bintan Island is not a surf destination but is branding itself as a sustainably developed island. Papua New Guinea is just recently becoming popular with surf tourists and has implemented a surf management plan. Lastly, there are many resorts catering specifically to surfers and to sustainable tourism; I chose a few that bring up challenges.

B. Context

1. Coastal Development in Bali

a) Background

(1) Physical

Bali is a volcanic island with a mountain chain running along the northern portion of the island (see Figure 3). Mount Agung is the highest on the island (10,473 feet) and is the most sacred mountain to the Balinese, considered the "Navel of the World."[115] Bali is classified as equatorial with a dry winter and there is little

Figure 3. "Bali" Google Earth

[115]Eko Budihardjo, *Architectural Conservation in Bali* (Yogyakarta, Indonesia: Gadjah Mada University Press, 1986), 18.

variation in temperature throughout the year due to its close proximity to the equator (see Figure 4). The island has two seasons: the dry season from May to September and the wet season from October to April.[116] The wind blows predominantly from the east south east from April to November and from the west in

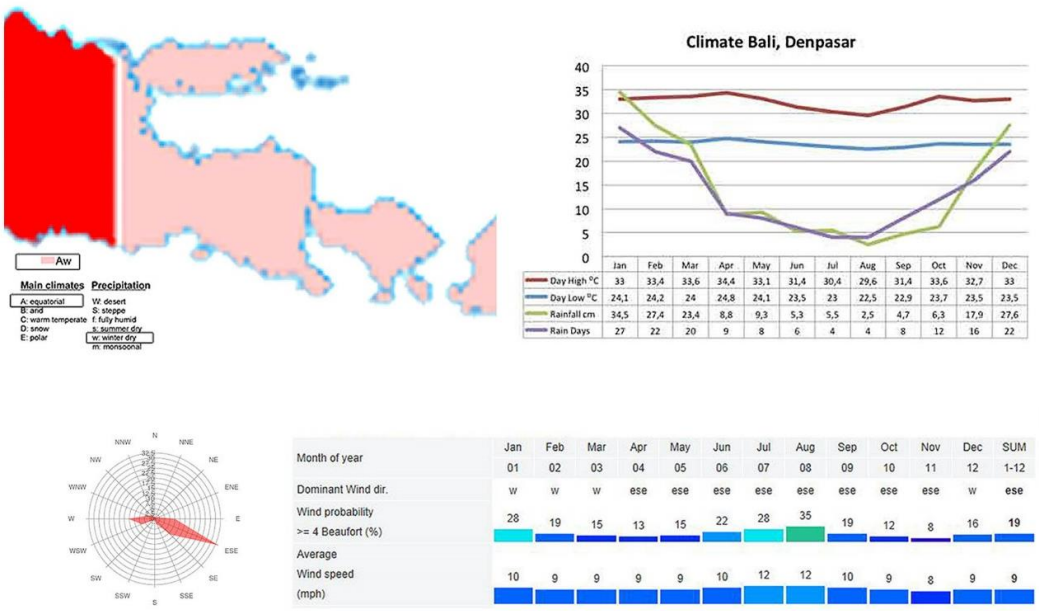

Figure 4. Top Left: Bali Climate Zone (OCHA), Top Right: Average Annual Temperature & Rainfall, Bottom Left: Kuta, Bali Wind Direction (Windfinder.com), Bottom Right: Kuta, Bali Wind Data (Windfinder.com)

December through March with an average wind speed of 8 to 12 mph.[117]

Bali has many rivers and springs and has developed a sophisticated social/cultural system to manage the distribution of fresh water in the *subak* system.[118] This system has been effectively managing entire watersheds since the 11th century on Bali.[119] A *subak* is a group of farmers who coordinate the

[116] "Bali Monthly Climate Average, Indonesia," *World Weather Online*, accessed December 10, 2013, http://www.worldweatheronline.com/Bali-weather-averages/Jawa-Tengah/ID.aspx.
[117] "Wind & Weather Statistics Kuta/Bali," *Windfinder*, accessed December 10, 2013, http://www.windfinder.com/windstats/windstatistic_kuta.htm.
[118] "Cultural Landscape of Bali Province: the Subak System as a Manifestation of Tri Hita Karana Philosophy," *UNESCO*, accessed December 1, 2013, http://whc.unesco.org/en/list/1194/.
[119] Ibid.

management of the water and the appropriate rituals at the water temple.[120] Water from springs travel through water temples, canals, tunnels and aqueducts to irrigate the rice fields. While the *subak* system manages the water for agriculture there is increasing demand for fresh water from the growing population and tourism development. Bali's aquifers are mostly small or locally productive (see Figure 5).

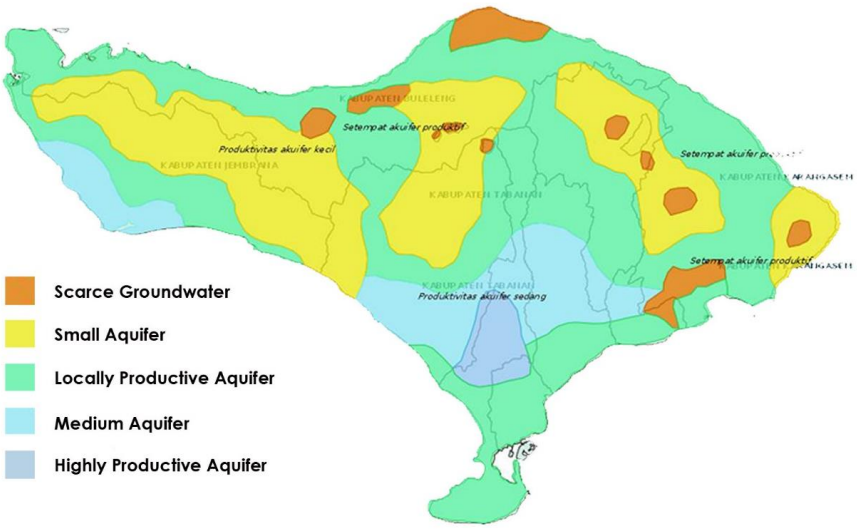

Figure 5. Aquifer Productivity on Bali (Badan Geologi)

Bali grows a variety of food crops including rice, maize, cassava, peanut, sweet potato and soybean. Among these rice takes up the majority of harvested area (see Figure 6), not including estate crops. The *subak* system has made Bali's rice highly productive.[121] The Green Revolution put the system in jeopardy when it came to Bali in 1971.[122] It introduced new strains of high yield rice, pesticides, fertilizer

[120] "Cultural Landscape of Bali Province: the Subak System as a Manifestation of Tri Hita Karana Philosophy," *UNESCO*, accessed December 1, 2013, http://whc.unesco.org/en/list/1194/.
[121] Stephen Lansing, "Perfect Order: A Thousand Years in Bali," *The Long Now Foundation*, accessed December 5, 2013, http://longnow.org/seminars/02006/feb/13/perfect-order-a-thousand-years-in-bali/.
[122] Ibid.

and a "plant as often as possible" policy.[123] This resulted in an enormous amount of the rice harvest lost to pests and the Balinese government decided to stop using the pesticides and go back to the traditional *subak* planting schedule.[124] Now the *subak* system in Bali has been put on the World Heritage List for both its tangible and intangible cultural heritage.[125]

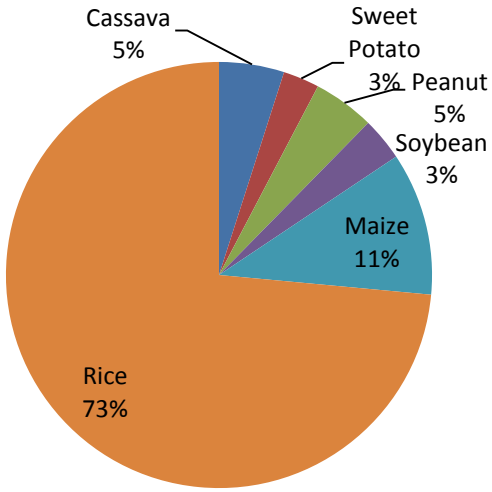

Figure 6. Harvested Area of Bali Yr 2012 (ha) - Authors own, data from Badan Pusat Statistik

[123] Stephen Lansing, "Perfect Order: A Thousand Years in Bali," *The Long Now Foundation*, accessed December 5, 2013, http://longnow.org/seminars/02006/feb/13/perfect-order-a-thousand-years-in-bali/.
[124] Ibid.
[125]"Cultural Landscape of Bali Province: the Subak System as a Manifestation of Tri Hita Karana Philosophy," *UNESCO*, accessed December 1, 2013, http://whc.unesco.org/en/list/1194/.

(2) Population

Bali has about 4.22 million residents as of 2012; Bali's Governor Made Mangku Pastika attributes the large growth to urbanization because people are moving to the island to take advantage of its strong economy.[126] The 2012 estimate makes Bali's average population density 673 people per square kilometer which is much denser than the national average of 124.[127] There are areas of the island, however, that are ten times denser than the average. The densest concentration of Bali's population is in the southern portion of the island around the capital of Denpasar (see Figure 7).

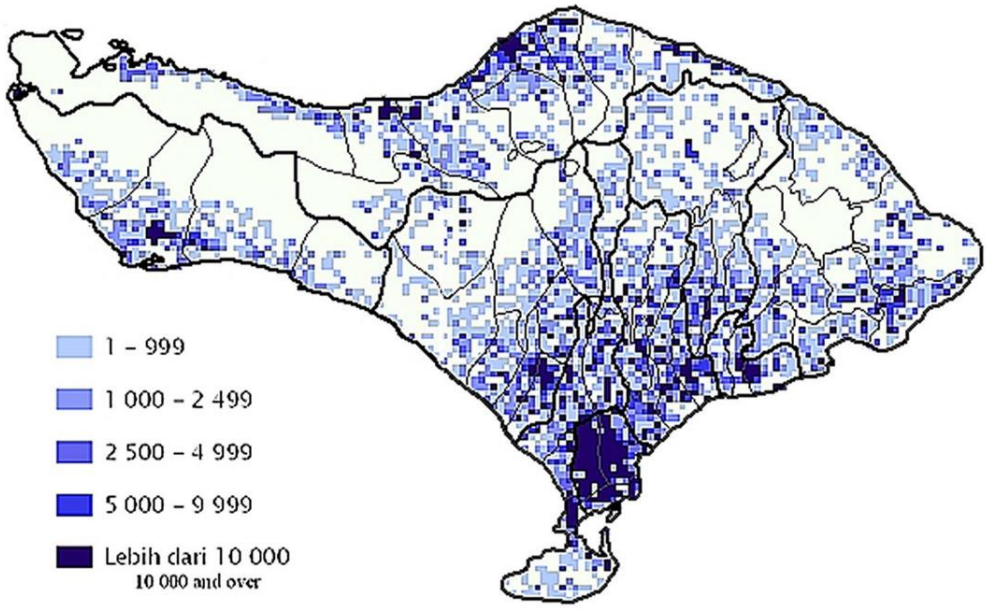

Figure 7. Population Density on Bali Yr 2000 (person/km2)

[126]Ni Komang Erviani, "Bali Faces Population Boom, Now Home to 4.2 Million Residents," *The Jakarta Post*, December 17, 2012, accessed December 1, 2013, http://www.thejakartapost.com/news/2012/12/17/bali-faces-population-boom-now-home-42-million-residents.html.
[127]Ibid.

(3) Energy

Indonesia has rich supplies of coal, oil and natural gas.[128] The majority of its electricity is generated by conventional thermal, over half of which is from coal (see Figure 8 Left).[129] Indonesia produces more coal than it consumes (see Figure 8 Right) and is the world's largest exporter of coal by weight, as of 2011.[130] Bali is

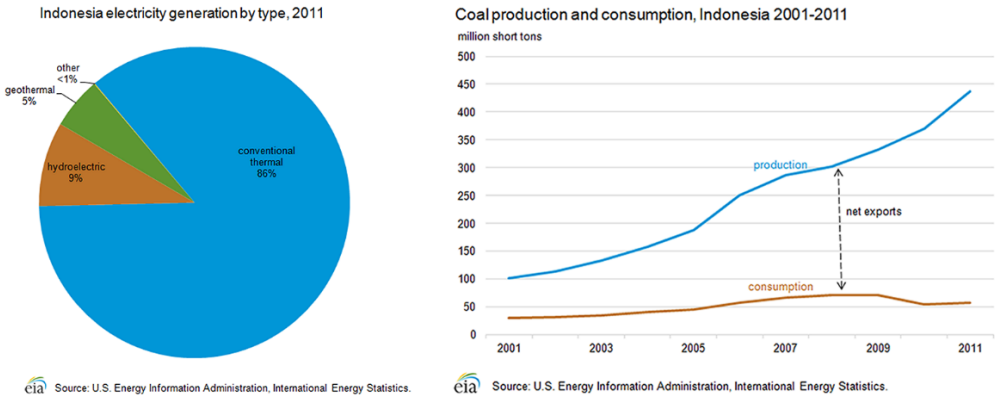

Figure 8. Left: Indonesia Electricity Generation by Type 2011 (Eoearth.org), Right: Indonesia Coal Production & Consumption 2001-2011 (Eoearth.org)

heavily dependent on Java for its electricity needs; Java supplies as much as thirty two percent of Bali's electricity through underwater cables.[131] The Indonesian government has plans to construct a geothermal plant on Bali but it has been rejected, as of 2012, by Bali's governor and community over cultural, religious and

[128] "Energy Profile of Indonesia," *The Encyclopedia of Earth*, accessed December 3, 2013, http://www.eoearth.org/view/article/51cbedb47896bb431f693544/.
[129] Ibid.
[130] Ibid.
[131] Wasti Atmodjo, "Bali to Have Adequate Electricity Supply: Minister," *The Jakarta Post*, September 4, 2012, accessed December 3, 2013, http://www.thejakartapost.com/bali-daily/2012-09-04/bali-have-adequate-electricity-supply-minister.html.

environmental concerns.[132] The proposed plant would be in the Bedugul forest which is a sacred area in the Balinese cosmology.[133]

(4) Waste

Bali has several waste and wastewater facilities scattered around the island (see Figure 9). Sanitation is one of the top three problems for both tourists and

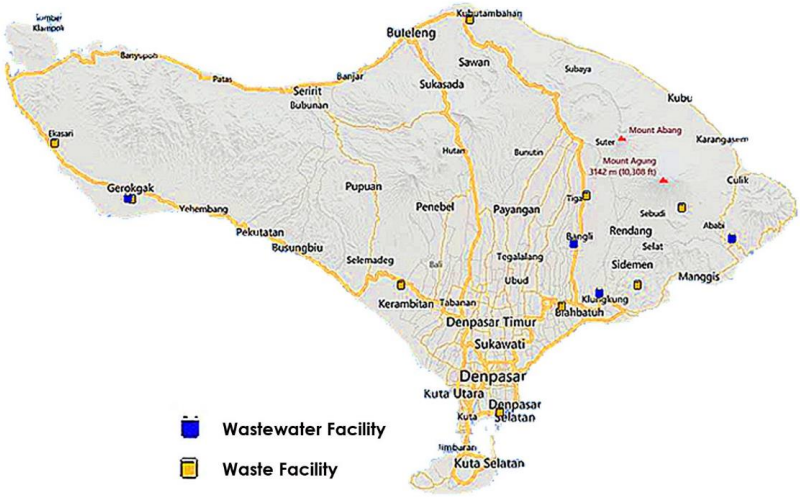

Figure 9. Bali Waste & Wastewater Facilities (SIGI-PU)

locals, according to the head of the Bali Tourism Agency.[134] The Suwung landfill, south of Denpasar, receives trash from the four administrative areas in southern Bali.[135] It is situated next to the ocean by Benoa Port and trash regularly washes into the ocean causing problems for the ships and Bali's image to tourists.[136] This

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[132] Wasti Atmodjo, "Bali to Have Adequate Electricity Supply: Minister," *The Jakarta Post*, September 4, 2012, accessed December 3, 2013, http://www.thejakartapost.com/bali-daily/2012-09-04/bali-have-adequate-electricity-supply-minister.html.
[133] Ibid.
[134] Wasti Atmodjo, "Trash Mars Bali's Image as Int'l Tourist Destination," *The Jakarta Post*, February 23, 2013, accessed November 27, 2013, http://www.thejakartapost.com/bali-daily/2013-02-23/trash-mars-bali-s-image-int-l-tourist-destination.html.
[135] Ibid.
[136] Ibid.

problem will continue to worsen without efforts to cut down on the production of garbage and to more effectively handle its disposal.

b) Patterns of Development

The Indonesian government has attempted to control the development and distribution of the population. The Transmigration Program moved people from more densely populated areas, including Bali, onto the less densely populated islands where they were given houses and land for farming.[137] This program has been widely criticized and the merits, or lack thereof, will not be debated here. This project was meant to relieve the growing pressure on resources as a result of large numbers of people moving to the cities and to increase development on the less populous islands.[138]Fearnside points out, however, that another purpose was to populate the smaller islands with Javanese in an effort to encourage national unity through cultural homogeny.[139]He also states that the site selection for settlement was sometimes chosen based on "troublesome areas."[140]Marr from Survival International corroborates this idea with a quote from Indonesia's Defense Minister indicating that moving Javanese to the border areas is strategic for defense and security.[141]Moving people away from Bali, however, does not follow this line of logic. The Balinese are mostly Hindu and ethnically distinct from the Javanese who are mostly Muslim. One can only speculate if the desire to develop land for the tourism industry impacted this decision.

Tourism is the other major influence on development patterns on the island of Bali. A catalyst for this development was the construction on the Ngurah Rai

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[137] "Transmigration in Indonesia," *The World Bank Group – Independent Evaluation Group*, accessed September 22, 2013, http://lnweb90.worldbank.org/oed/oeddoclib.nsf/DocUNIDViewForJavaSearch/4B8B0E01445D8351852567F5005D87B8.
[138] Ibid.
[139] Philip M. Fearnside, "Transmigration in Indonesia: Lessons From Its Environmental and Social Impacts," *Environmental Management*, Vol. 21, No. 4 (1997): 553, accessed September 22, 2013, http://www.academia.edu/1196557/Transmigration_in_Indonesia_Lessons_from_its_environmental_and_social_impacts.
[140] Ibid., 566.
[141] Carolyn Marr, "Uprooting People, Destroying Cultures," *The Multinational Monitor,* Vol. 11, No. 10 (1990), accessed September 22, 2013, http://www.multinationalmonitor.org/hyper/issues/1990/10/marr.html.

International Airport. This enabled foreign tourists to fly directly to Bali without having to go through the airport on Java. Visitor arrivals increased; however, there were not enough first class hotel accommodations to meet the demand.[142]In 1971 the Indonesian government commissioned a French consulting firm, SCETO, to create a tourism master plan.[143] This plan pinpointed three areas in southern Bali to concentrate the development: Nusa Dua, Sanur and Kuta.[144]

One consideration when choosing a site for tourism development was the proximity to Balinese communities. The planners were concerned that tourists would be detrimental to the Balinese culture.[145] As a result of cultural beliefs, which will be discussed later, most Balinese people preferred to live inland so the coastal areas tended to be populated with poorer members of society.[146] The Bukit Peninsula was sparsely populated at the time and geographically remote from the rest of Bali.[147] The dilemma, however, was that tourists were coming to Bali to experience the culture. The master plan had to incorporate some routes for the tourists to visit the traditional Balinese villages in order to experience the authentic culture.[148]

Nusa Dua on the Bukit Peninsula was considered an ideal area for tourism development.[149] Nusa Dua was selected because there was abundant cheap land available that wasn't suitable for farming.[150] It was also desirable for tourists since it has a white sand beach and is close to the airport. In order to encourage

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[142] "Report and Recommendation of the President to the Executive Directors on a Proposed Credit to the Republic of Indonesia for the Bali Tourism Project," *The World Bank*, 7, accessed November 3, 2013, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2002/07/02/000178830_98101902223931/Rendered/PDF/multi0page.pdf.
[143] Michel Picard, "Cultural Tourism in Bali: National Integration and Regional Differentiation," in *Tourism in South-East Asia*, ed. Michael Hitchcock, Victor T. King and Michael J.G. Parnwell (New York: Routledge, 1993), 79.
[144]Stephen P. Dibnah, *An Assessment of Spatial Arrangement Plans for Tourist Areas in Bali* (North York, Ont.: University Consortium on the Environment, 1992), 8.
[145] Antonia Hussey, "Resources for Development: Tourism and Small Scale Indigenous Enterprise in Bali" (PhD diss., The University of Hawaii, 1986), 48.
[146] Norman Backhaus, "Globalisation and Marine Resource Use in Bali," in *Environmental Challenges in South-East Asia*, ed. Victor T. King (Richmond, Surrey: Curzon Press, 1998), 177.
[147] Hussey, "Resources for Development," 47.
[148] Picard, "Cultural Tourism in Bali," 79-80.
[149] "Report and Recommendation of the President," 8.
[150] Hussey, "Resources for Development," 47.

development in Nusa Dua and prevent over building, the plan limited the number of "international class hotel rooms" outside of the Bukit Peninsula. [151]

The plan to make Bali a high end tourist resort area did not necessarily go as expected. A large number of budget travelers started visiting Bali and the enterprising residents stepped in to meet this demand. Budget accommodations sprang up in Kuta, as well as areas that were not in the original master plan such as Ubud, Batur, Lovina and Candidasa.[152] The budget accommodations grew to rival the high end accommodations. Bali's tourist industry is thus divided between two user profiles: high spending and low spending.[153] This phenomenon can also be seen in the surf tourism in Bali with a variety of hotels catering specifically to surfers ranging in price from 10 Euros per night for a home stay to 260 Euros per night for an oceanfront villa.[154]

The village of Kuta was at first glance unappealing as a vacation destination. It sits on a flat area that tends to be hot and humid year round.[155] Before tourism took hold it was a typical fishing village with mostly unproductive land; some dry crops such as coconut and cassava root were grown.[156] Since Kuta did not have any important temples and was not lush like other areas of the island it was largely ignored by the Balinese.[157] The Balinese did not view Kuta's long white sand beach as an asset.

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[151] "Report and Recommendation of the President to the Executive Directors on a Proposed Credit to the Republic of Indonesia for the Bali Tourism Project," *The World Bank*, 13, accessed November 3, 2013, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2002/07/02/000178830_98101902223931/Rendered/PDF/multi0page.pdf.
[152] Michel Picard, "Cultural Tourism in Bali: National Integration and Regional Differentiation," in *Tourism in South-East Asia*, ed. Michael Hitchcock, Victor T. King and Michael J.G. Parnwell (New York: Routledge, 1993), 81.
[153] Ibid., 81.
[154] "Select Your Accommodation by Price or by Area," *One 2 Surf Bali*, accessed December 1, 2013, http://www.one2surfbali.com/accommodation.html.
[155] "Average Weather in Kuta, Indonesia," *World Weather and Climate Information*, accessed November 10, 2013, http://www.weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine-fahrenheit,kuta,Indonesia.
[156] Antonia Hussey, "Resources for Development: Tourism and Small Scale Indigenous Enterprise in Bali" (PhD diss., The University of Hawaii, 1986), 65.
[157] Ibid., 64-65.

A confluence of factors led to Kuta's development as a major tourist destination. Kuta's proximity to the international airport and the existence of two relatively wide roads connecting it to the highway leading to the airport made for easy access.[158] Another important geographic advantage for Bali as a whole is its distance from Australia (about a 5 hour flight to Sydney), which is a major source of tourists, and the availability of cheap flights.[159] Australian surfers were the first large group of tourists to visit Kuta[160] due to the factors above as well as the fact that the popular surf spots were around Kuta and the Bukit Peninsula.

Kuta's development started as a cluster around a residential core and along the main road of Jalan Legian/Buni Sari on a north-south axis (see Figure 10). The first tourist accommodations in Kuta were in family compounds in this residential core.[161] From there it spread out up to the edge of the ocean, north, south and inland. In the early days of tourism the only structures that were oceanfront were a few bungalows and small hotels. By 1974, the number of accommodations and tourist oriented businesses, such as restaurants and art shops, had grown along the main roads as well as the oceanfront near the

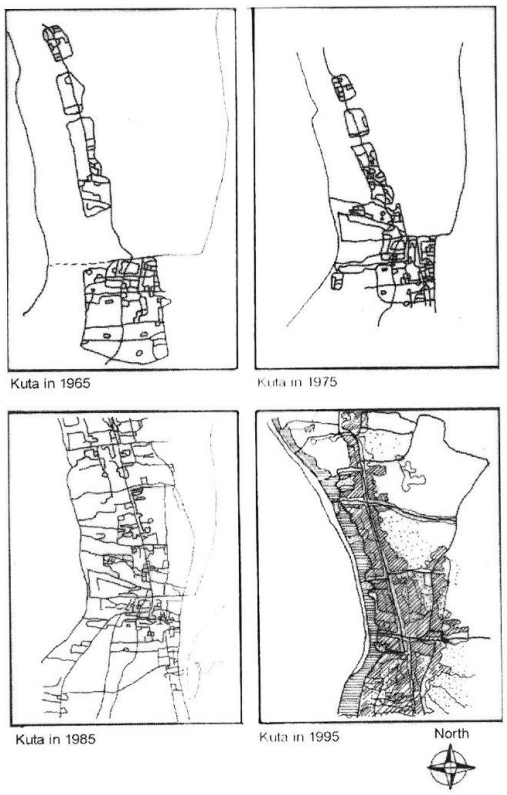


Figure 10. Kuta Development Over 30 Year Span (Reproduced from Pratiwi (2009, fig. 6.2))

[158] Antonia Hussey, "Resources for Development: Tourism and Small Scale Indigenous Enterprise in Bali" (PhD diss., The University of Hawaii, 1986), 69.
[159] Ibid.
[160] Ibid., 68.
[161] Ibid., 73.

residential core (see Figure 11). Today, the development spans the entire coastline of Kuta.

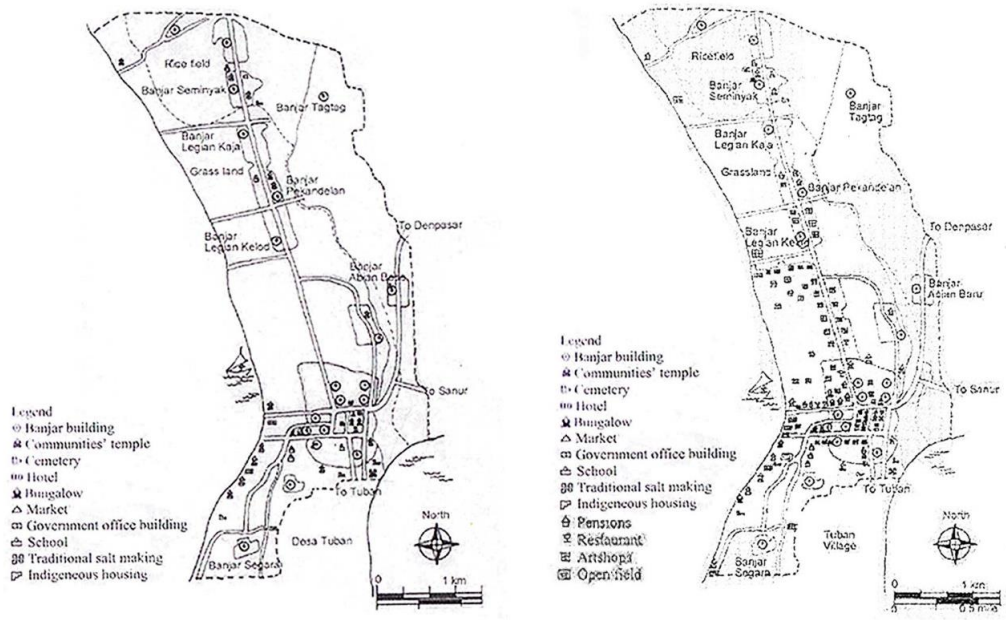


Figure 11. Left: Kuta Development in 1965 (Reproduced from Pratiwi (2009, fig. 6.3)) Right: Kuta Development in 1974 (Reproduced from Pratiwi (2009, fig. 6.4))

Dwita Hadi Rahmi performed a field survey in Kuta in 1991 which is useful in understanding the land use and pattern of development in Kuta. Rahmi's study area was a 37.5 ha piece of land in the original residential core (see Figure 12 Top).[162] The land use map reveals that tourist accommodations and services make up 62% of the area.[163] This indicates how important tourism is in Kuta. Tourist accommodations include hotels, *losmen*[164] and bungalows while housing includes houses with rooms

[162] Dwita Hadi Rahmi, *Integrated Development for Spatial, Water Supply, and Sanitation Systems in the Tourism Area of Kuta, Bali, Indonesia* (Waterloo, Canada: The University of Waterloo, 1992), 6.
[163] Ibid., 62-63.
[164] Losmen are structures originally built inside family residential compounds, run by the family, specifically for tourist accommodations not migrants.

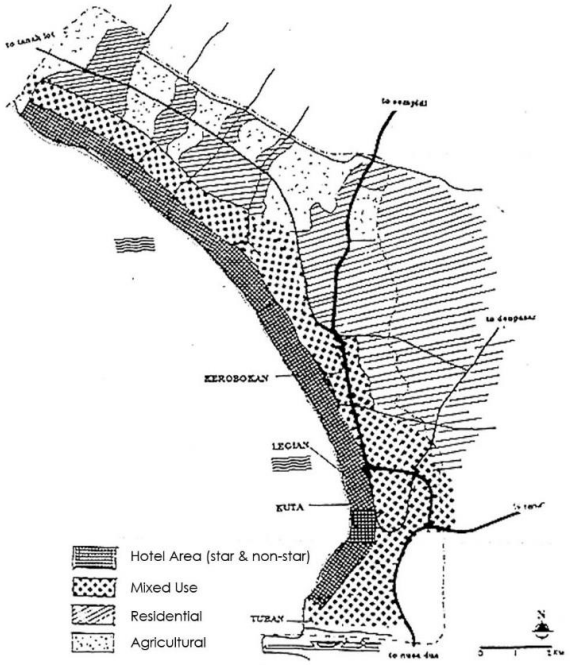
for rent.[165] This overlapping functionality of housing and tourist lodging reflects the evolution of development of the tourist industry in Kuta. The spatial distribution of different functions grew spontaneously out of the unplanned budget travelers' needs and the local response to supply those needs.

The majority of the oceanfront areas in Rahmi's study area are tourist accommodations which were former coconut plantations.[166] Tourist services, such as shops and restaurants, which need a prominent location tend to occupy the land along the main roads. Housing is still clustered around the core near Legian Street. The building density tends to be higher in these housing areas (see Figure 12 Bottom). As expected the density is lower around the oceanfront accommodations which cater to the tourist preference for open areas. Rahmi notes that the building coverage ratio in the houses and commercial buildings exceeds the government regulations.[167]

Figure 12. Top: Rahmi's Kuta Study Area (Reproduced from Rahmi (1992, fig.1.2)), Middle: Land Use in Rahmi's Kuta Study Area (Reproduced from Rahmi (1992, fig.4.2), modified), Bottom: Building Density in Rahmi's Kuta Study Area (Reproduced from Rahmi (1992, fig.4

[165] Dwita Hadi Rahmi, *Integrated Development for Spatial, Water Supply, and Sanitation Systems in the Tourism Area of Kuta, Bali, Indonesia* (Waterloo, Canada: The University of Waterloo, 1992), 61.
[166] Ibid.
[167] Ibid., 68.

The Kuta Tourism Master Plan (1991) designates a 500 meter[168] wide ribbon of the oceanfront land to hotels while the purely residential areas are shifted inland (see Figure 13 Top). The buffer between these two zones is designated as mixed use, however, almost all of Rahmi's study area could be considered mixed use because of the overlap between housing/lodging and housing/services. The designation of the hotel area favors large scale high end development which indicates that the government was attempting to move Kuta away from its budget accommodation roots.



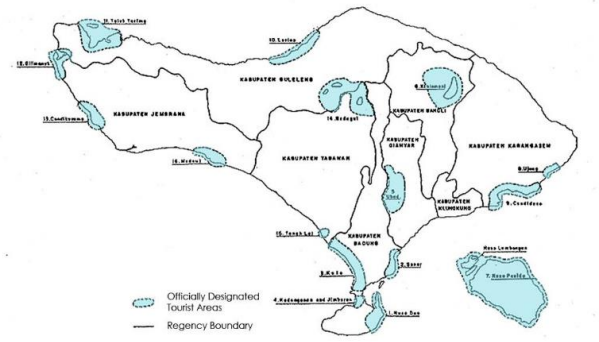


Figure 13. Top: Kuta Tourism Master Plan, 1991 (Reproduced from Rahmi (1992, fig.6.1)), Bottom: Designated Tourist Areas on Bali (Reproduced from Dibnah (1992, fig. 1), modified)

The original master plan's limitation on building was rescinded in 1988 when the Provincial Government of Bali decided to decentralize the tourism development across the island.[169] Decision Letter Number 15 (1988) set up 15 areas across the island that would be devoted to tourism development, with a

[168] Dwita Hadi Rahmi, *Integrated Development for Spatial, Water Supply, and Sanitation Systems in the Tourism Area of Kuta, Bali, Indonesia* (Waterloo, Canada: The University of Waterloo, 1992), 101.
[169] Stephen P. Dibnah, *An Assessment of Spatial Arrangement Plans for Tourist Areas in Bali* (North York, Ont.: University Consortium on the Environment, 1992), 10.

16th area added soon after (see Figure 13 Bottom).[170] The majority of these areas are on the coast. The decision to decentralize was enacted in order to distribute the economic benefits across the whole island and to reduce the negative effects on Bali's people and environment.[171]

The Balinese government decided that each of the 16 tourist development areas needed a plan so they prepared Spatial Arrangement Plan for Tourist Areas (SAPTA).[172] The SAPTA's were guidelines covering the following areas:[173]

- Population distribution and density
- Land use plan
- Services plan
- Road and utilities networks
- Building height, density and setbacks
- Development programs
- Environmental management

Dibnah points out that these SAPTAs did not address many important factors such as the level and type of development appropriate for an area and the impact development would have on the surrounding areas.[174] The rules in place that were meant to control development have been adopted unevenly. Some guidelines are mostly followed, such as the restriction on building height, while others, such as building setbacks from the shoreline, are ignored in many areas.[175]

Bali has since gone through a variety of spatial development plans. The national plan, Kawasan Strategis Pariwisata Nasional (KSPN), established 11 tourist areas on Bali.[176] The related bylaw No. 16 (2009) is meant to regulate zoning, and therefore development, around sacred sites, cliffs, riverbanks, lake shores and

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[170] Stephen P. Dibnah, *An Assessment of Spatial Arrangement Plans for Tourist Areas in Bali* (North York, Ont.: University Consortium on the Environment, 1992), 11.
[171] Ibid., 10.
[172] Ibid., 16.
[173] Ibid., 16-17.
[174] Ibid., 24.
[175] Ibid., 29.
[176] "Bali Governor Suspends Eleven Tourism Strategic Areas in Bali," *The Bali Times*, November 11, 2013, accessed December 1, 2013, http://www.thebalitimes.com/2013/11/11/bali-governor-suspends-eleven-tourism-strategic-areas-in-bali/.

coastlines.[177] As of November 2013 these plans will not be implemented because of the inclusion of sacred religious sites.[178] Bali's Governor Made Mangku Pastika put the KSPN plans on hold over concerns from the community about making sacred sites part of a tourist zone.[179]

c) Environmental Impact

(1) Natural Resources

One of the most important natural resources for human survival is freshwater. Bali is a tourist destination and faces challenges dealing with limited resources like other islands. Fresh water quality and supply is a major concern. As Bali's quality control environmental laboratory has noted, some of the island's fresh water supply is not suitable for drinking.[180] After talking to numerous locals I found out that many people pay to have clean water brought to their houses for drinking. Tourism development puts large demands on the freshwater supply that competes with the needs of residents and other industries. According to the World Resources Institute, Bali is in the most critical category - Extremely High Risk (see Figure 14). This index takes into account water availability, water quality, climate change, and increasing demand.[181]

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[177] Luh De Suriyani, "Governor Insists on Enforcing Zoning Bylaw Across Bali," *The Jakarta Post,* March 26, 2011, accessed November 30, 2013, http://www.thejakartapost.com/news/2011/03/26/governor-insists-enforcing-zoning-bylaw-across-bali.html.

[178] "Bali Governor Suspends Eleven Tourism Strategic Areas in Bali," *The Bali Times*, November 11, 2013, accessed December 1, 2013, http://www.thebalitimes.com/2013/11/11/bali-governor-suspends-eleven-tourism-strategic-areas-in-bali/.

[179] "Bali Governor Suspends."

[180] Luh De Suriyani, "Tests Prove Low Water Quality: Experts," *The Jakarta Post,* February 13, 2013, accessed December 20, 2015, http://www.thebalidaily.com/2013-02-13/tests-prove-low-water-quality-experts.html.

[181] "Aqueduct Global Maps 2.1 Indicators," *World Resources Institute*, accessed February 24, 2016, http://www.wri.org/publication/aqueduct-global-maps-21-indicators.

Figure 14. Indonesia's Fresh Water Risk (Aqueduct Water Risk Atlas)

Since good surf relies on reefs it is useful to look at the state of Bali's reefs. The World Resources Institute has created a report focusing on the "Coral Triangle" (which Indonesia is part of) because this region is much more threatened than the global average.[182] The report looks at threats from overfishing and destructive fishing, coastal development, watershed-based pollution, and marine-based pollution and damage.[183] Bali is considered Very High risk (see Figure 15 Top). The report also broke down the reef risk isolating only the coastal development threat; Bali is categorized as Medium and High risk (see Figure 15 Bottom).

[182] "Reefs at Risk Revisited in the Coral Triangle," *World Resources Institute*, accessed February 24, 2016, http://www.wri.org/publication/reefs-risk-revisited-coral-triangle.
[183] Ibid.

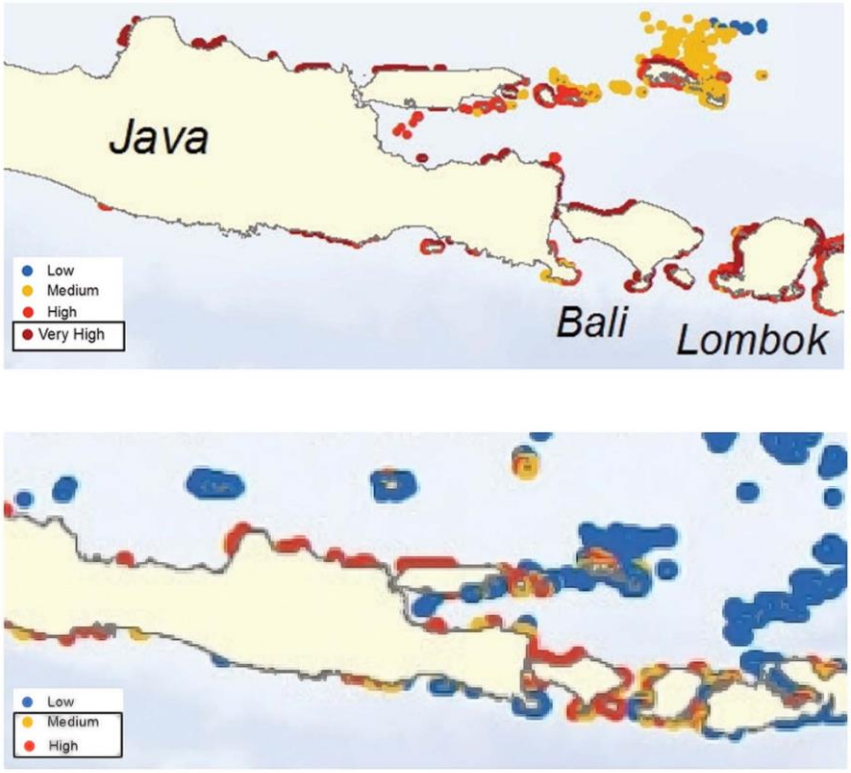

Figure 15. Top: Overall Reef Risk (Reproduced from Burke et al. (2012, map 2.2)), Bottom: Reef Risk from Coastal Development (Reproduced from Burke et al. (2012, map 2.3))

2. Natural Disasters

Bali is susceptible to several types of natural disasters (see Figure 16). The island has three volcanoes with varying levels of activity. According to the Smithsonian Institution, Bratan has not had any recorded eruptions.[184] Batur has been erupting regularly with the most recent being 1999, and has had mild-to-moderate explosive activity.[185] The most recent eruption at Agung was 1963 which was "one of the world's largest of the 20th century, produced voluminous ashfall and devastating pyroclastic flows and lahars that caused extensive damage and many

[184] "Volcano Info – Bratan," *Smithsonian Institution Global Volcanism Program*, accessed December 10, 2013, http://www.volcano.si.edu/volcano.cfm?vn=264001.
[185] "Volcano Info – Batur," *Smithsonian Institution Global Volcanism Program*, accessed December 10, 2013, http://www.volcano.si.edu/volcano.cfm?vn=264010.

fatalities."[186] Bali also has intense earthquakes and the risk of tsunamis and storm surges, however, the tropical storms are at the lowest intensity (see Figure 16 Top). The risk of having multiple hazards like a hurricane, earthquake, flood and landslide is on the high end for most of the island (see Figure 16 Bottom).

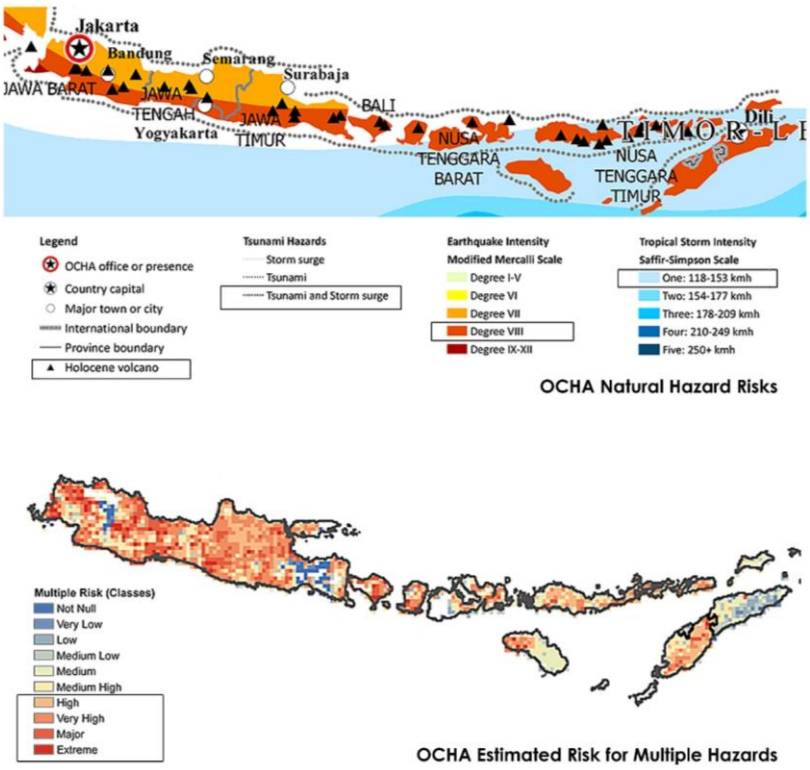

Figure 16. Top: Indonesia: Natural Hazard Risks (OCHA), Bottom: Indonesia Risk for Multiple Hazards (OCHA)

Indonesia has a great deal of seismic activity. With active volcanoes and a subduction zone nearby, Bali is prone to earthquakes. According to the USGS, the southern portion of Bali falls into one of the highest categories for seismic hazard

[186] "Volcano Info – Agung," *Smithsonian Institution Global Volcanism Program*, accessed December 10, 2013, http://www.volcano.si.edu/volcano.cfm?vn=264020.

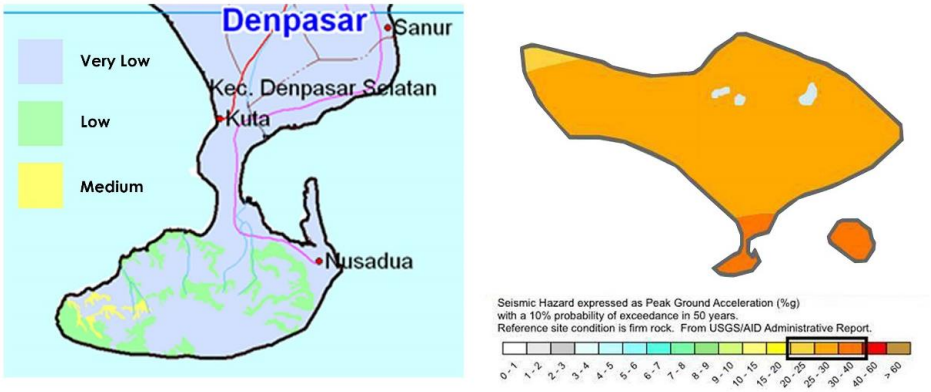

Figure 17. Left: Ground Movement Susceptibility Zones (Badan Geologi), Right: Bali's Seismic Hazard (USGS)

(see Figure 17 Right). This map indicates the Peak Ground Acceleration as a percentage of g forces with a 10% probability of exceedance in 50 years. While this looks alarming it is noted in the USGS report that the active faults in the Bali region have not been mapped in enough detail to make them useful to determine the seismic hazard; however there is a great need for more information and study.[187] There is, therefore, a disparity between the USGS map and the Peta Zona Kerentanan Gerakan Tanah Provinsi Bali which shows the susceptibility to ground movement (see Figure 17 Left). On this map most of the southern part of Bali is in the very low to low susceptibility to ground movement zone. Nevertheless, the threat of an earthquake should be considered when planning for any development in Bali.

Tsunamis are of particular concern on the southern portion of Bali at the neck of the Bukit Peninsula (see Figure 18 Top Left). This area is bordered on the east by Benoa Bay and the airport runway juts out of its western side. The risk to human life can be assessed by looking at the population density in this area (see Figure 18 Top Right). The coastal area on the west, north of the airport through Kuta is the more densely populated area that is at risk. The coastal area around Benoa Bay on the east is mostly sparsely populated. Another important factor is the time it takes people to evacuate to a safe zone in the event of a tsunami (see Figure 18 Bottom

[187] Mark Petersen et al., "Documentation for the Southeast Asia Seismic Hazard Maps," *U.S. Department of the Interior, U.S. Geological Survey*, Administrative Report September 30, 2007, p. 24, Accessed September 6, 2015, http://earthquake.usgs.gov/hazards/products/images/SEASIA_2007.pdf.

Left). Taking into account all of these factors produces a map showing the overall tsunami risk (see Figure 18 Bottom Right).

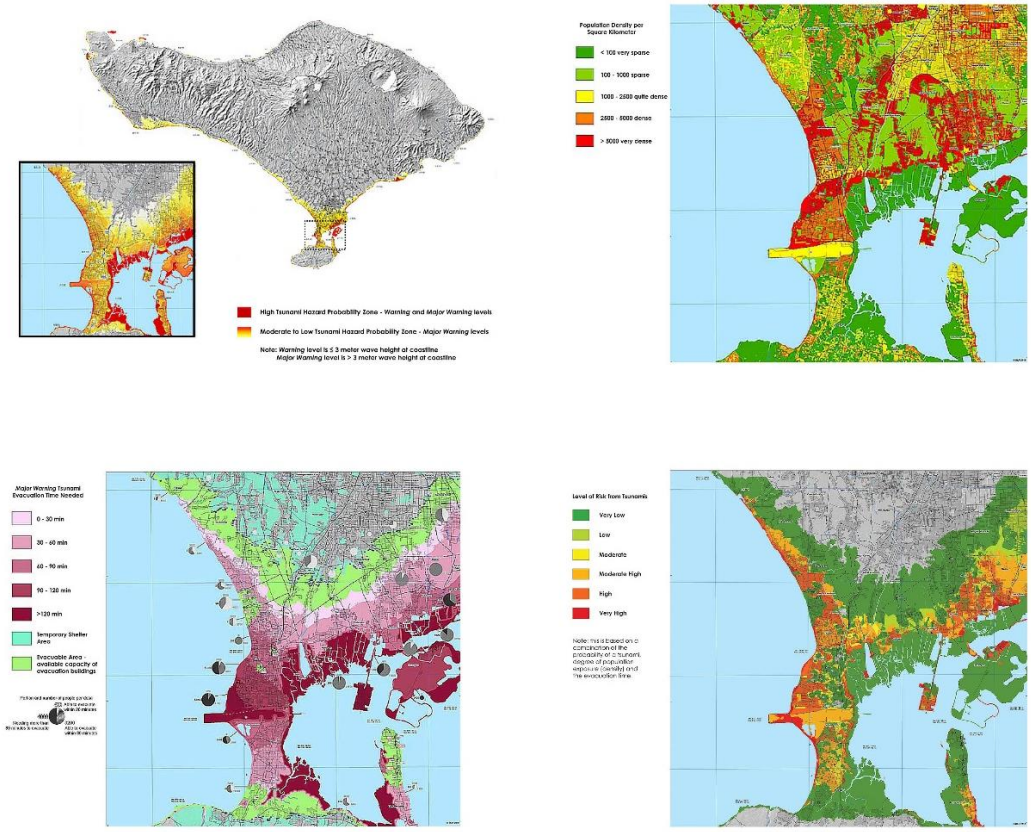

Figure 18. Top Left: Tsunami Hazard Probability Risk (GITEWS), Top Right: Population Density of Kuta (GITEWS), Bottom Left: Tsunami Evacuation Time of Kuta (GITEWS), Bottom Right: Tsunami Overall Risk for Kuta (GITEWS)

3. Balinese Design Principles

The vernacular architecture of Bali is an expression of their culture and religion. One cannot discuss or analyze this architecture without understanding the Balinese Hindu philosophy. Both the macrocosm and the microcosm are divided into three parts. This division into three repeats itself in the philosophical underpinnings and the resulting physical forms.

Tri Hita Karana is an important philosophical concept in Balinese Hinduism. It says that everything has a soul (*Atma*), physical body (*Sarira*) and power or ability

(*Trikaya*).[188] *Tri Hita Karana* manifests itself in the architecture and planning on Bali through *Tri Angga*.[189] Again everything is divided into three. The three realms of *Tri Angga* are *Nista*, *Madya* and *Utama*.[190] This division is also an analogy for the human body (see Figure 19).

The low or impure is *Nista* which corresponds to the legs and also the low areas of topography and the ocean.[191] This realm is associated with evil spirits and the dead[192] which explains why the Balinese are not seafaring people and view the ocean as a place that should be entered with caution.[193] In the household this would be the dirty areas like the kitchen, pigsty, granary and entrance.[194]

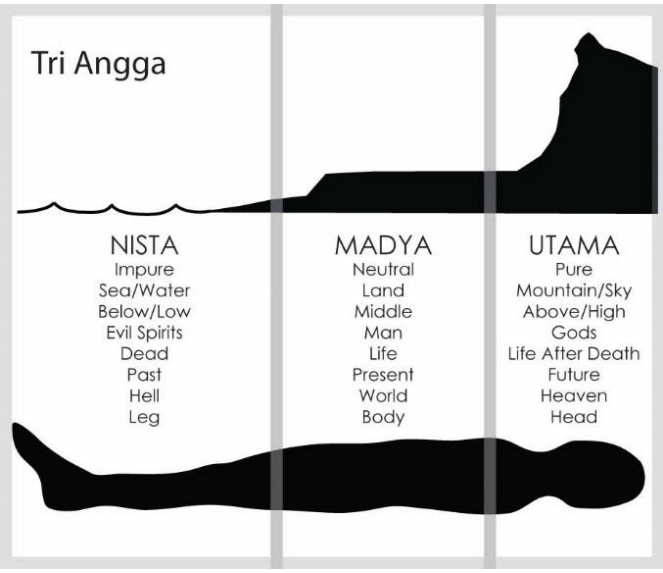

Figure 19. Tri Angga – Authors own, adapted from Budihardjo (1986, p. 32 - 39)

The middle zone is represented by the torso and is where humans reside in both a physical and spiritual sense.[195] This *Madya* area is the land, the present and

[188] Eko Budihardjo, *Architectural Conservation in Bali* (Yogyakarta, Indonesia: Gadjah Mada University Press, 1986), 33.
[189] Ibid.
[190] Ibid.
[191] Ibid., 33, 35.
[192] Ibid.
[193] Norman Backhaus, "Globalisation and Marine Resource Use in Bali," in *Environmental Challenges in South-East Asia*, ed. Victor T. King (Richmond, Surrey: Curzon Press, 1998), 177.
[194] Budihardjo, *Architectural Conservation*, 34.
[195] Ibid., 33.

the world.[196] It is where human activity takes place. The areas of the household compound that are for sleeping and working fall into this component.[197]

The third part of *Tri Angga* is *Utama*. This is the head and the high portions in the topography such as the mountains.[198]*Utama* is the realm of the gods and therefore the most pure as well as being where heaven is located.[199]The area where the shrine is placed would be this component in the household compound.[200]

Another important concept relates to cosmological orientation. *Nawa Sanga* or *Sanga Mandala* emphasizes two main axes: mountain-sea and sunrise-sunset (see Figure 20).[201] The mountain is sacred, therefore, the most sacred buildings, such as temples and family shrines, are closest to the mountain while the public buildings are towards the sea.[202] This orientation dictates the village planning and arrangement of buildings in family compounds.

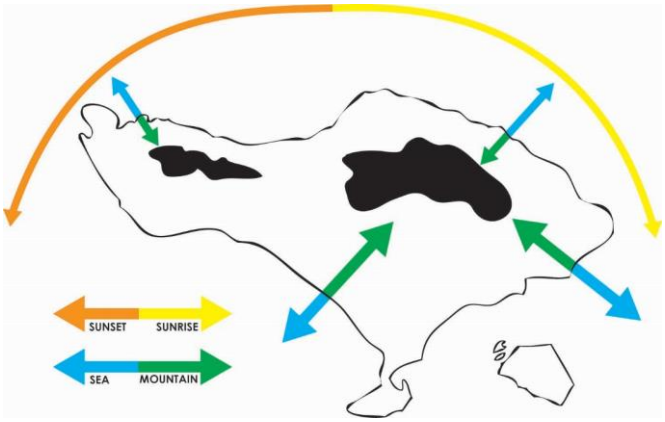

Figure 20. Major Cosmic Axes – Authors own, adapted from Budihardjo (1986, p. 4)

Starting at the macro level traditional Balinese villages are laid out in relation to Mt. Agung or the closest visible mountain, the ocean, east and west. Budihardjo depicts a typical Balinese village layout assuming it is on the southern portion of the island (see Figure 21 Top Left).[203] Likewise the housing compound plan is laid out with the same concepts (see Figure 21 Top Right). Tri

[196] Eko Budihardjo, *Architectural Conservation in Bali* (Yogyakarta, Indonesia: Gadjah Mada University Press, 1986), 35.
[197] Ibid., 34.
[198] Ibid., 33.
[199] Ibid., 33, 35.
[200] Ibid., 34-35.
[201] Ibid., 41.
[202] Ibid.
[203] Ibid., 52-54.

Angga is then expressed in the building's relative elevations and the parts of the structure, all representing Utama, Madya or Nista (see Figure 21 Bottom).

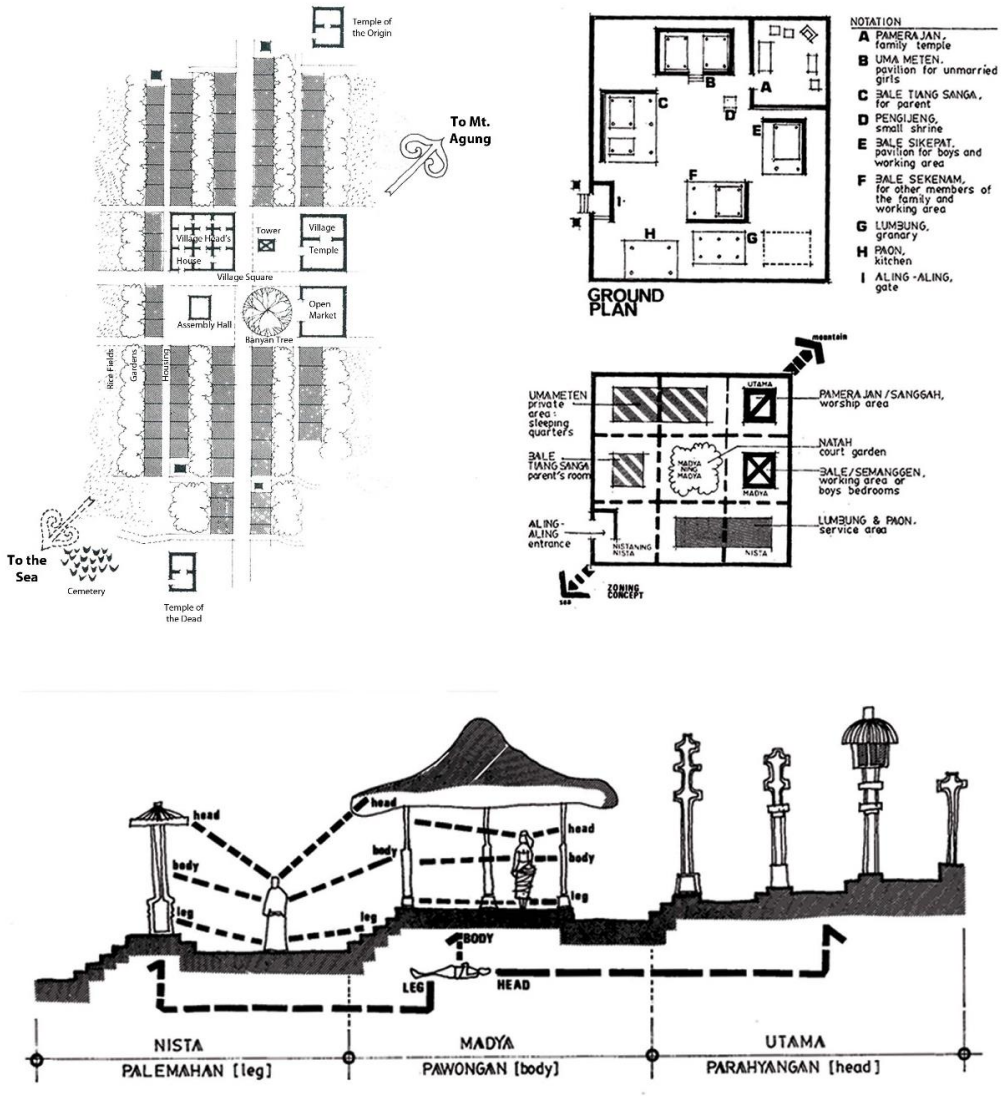

Figure 21. Top Left: Typical Balinese Village Layout (Reproduced from Budihardjo (1986, fig. 9)), Top Right: Typical Balinese House Layout (Reproduced from Budihardjo (1986, fig. 16)), Bottom: Tri Angga Concept in a Balinese House (Reproduced from Budihardjo (198

4. Optimal Surf Criteria

When surfers are deciding on the best place to surf, whether it is at home or far away, there are several factors to consider. First are the elements that influence the wave formation itself such as weather patterns (wind, temperature, tide), the topography of the ocean floor in an area, and the direction of the swell. The other things that surfers consider are the shape and size of the waves, accessibility of the waves, crowd, water quality and dangers such as sharks. When considering a surf trip, cost is also a big consideration.

a) Wave Formation

(1) Wind

Waves are created by wind blowing on the ocean surface. Energy is transferred from the wind to the ocean.[204] The size of the waves is determined by the velocity of the wind, length of time and distance that it is in contact with the ocean.[205]Waves lose their energy, or decay, as they travel away from their origin.[206]This is why surfers are constantly monitoring storm systems that can be thousands of miles away from where they intend to surf.

The wind also affects the wave shape when it reaches shore. Wind blowing offshore is ideal for creating steep, barreling waves because it "physically holds up the wave, and therefore delays breaking until the wave gets into shallower water" [207](see Figure 22 Top). Winds blowing onshore create "mushy" waves which are less steep and generally break in sections instead of peeling in a continuous line (see Figure 22 Bottom).

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[204] "Wave Energy, Decay and Direction," *Surfline*, accessed September 23, 2013, http://www.surfline.com/surfology/surfology_forecast_index.cfm.
[205] Ibid.
[206] Ibid.
[207] Tony Butt, Paul Russell, and Rick Grigg, *Surf Science* (Honolulu: University of Hawaii Press, 2005), 64.

Figure 22. Top: Waves with Offshore Wind (Surferwaynekelly.com), Bottom: Waves with Onshore Wind (2.bp.blogspot.com)

(2) Ocean Floor Bathymetry

The bathymetry, contours of the ocean floor, near the shore is important because it affects where the wave will break, its shape and how it will act. Shallow areas make waves slow down which makes the wave bend towards that area; this is called refraction (see Figure 23). [208]The type of bottom (reef, sand, rock) and location of the shallow spots (point-break, reef-break, and beach-break) determine the character of a surf spot.[209]This character expresses itself in the shape of the waves, speed at which they break, steepness and length. Every surfer has an ideal wave which could be, and is, debated endlessly. Personal preferences for wave types

[208] Tony Butt, Paul Russell, and Rick Grigg, *Surf Science* (Honolulu: University of Hawaii Press, 2005), 51.
[209] Ibid., 52.

often depend on skill level, experience with different types of waves, equipment, and goals for that surf session.

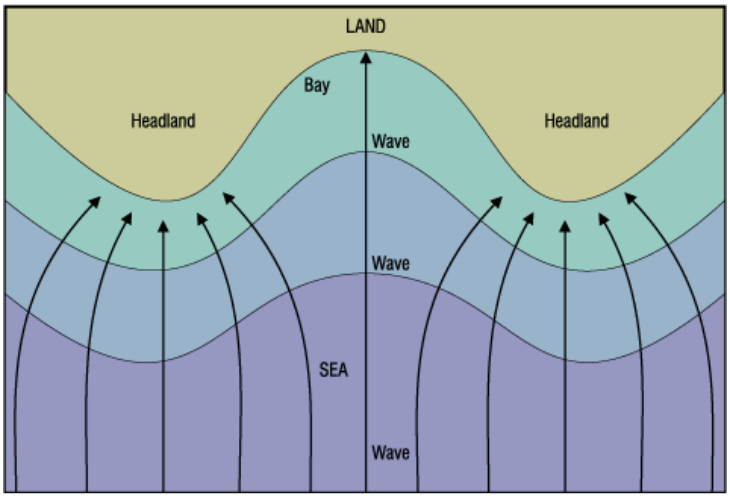

Figure 23. Refraction (Reproduced from Butt et al. (2005. fig. 6.1)

(3) Swell Window

Every surf spot on Earth has a specific swell window. This is the optimal direction from which the wave energy is generated. This is an important factor to surfers because a location could be shadowed by a land mass or island and thus never receive any waves even though there is a massive storm that transferred lots of energy to the ocean. The islands in the south Pacific mainly get swell from the "roaring forties", [210]which is an area of strong consistent winds between latitudes 40 and 50 degrees south.[211]

b) Accessibility

How easily a break can be accessed has historically contributed to the idea of "surfability". Whether a surfer can easily reach the ocean by vehicle or on foot carrying their surfboard is a factor in choosing a spot to surf. Access can be limited due to a lack of infrastructure, private land, or a natural barrier such as a cliff.

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[210] Tony Butt, Paul Russell, and Rick Grigg, *Surf Science* (Honolulu: University of Hawaii Press, 2005), 117.
[211] "Roaring Forties," *Encyclopeadia Britannica*, accessed October 4, 2013, http://www.britannica.com/EBchecked/topic/505226/roaring-forties.

Improving infrastructure and technology has made waves easy to reach and find leading to overcrowding in breaks that used to be deserted.

c) Crowds

The number of people at a particular surf break plays an important role. Every break has an area that is the optimal location to catch that particular wave. The size of this zone varies from break to break and can be dependent on tides, swell direction, swell size and wind. Surfing etiquette dictates that the surfer who is closest to the peak in this zone has priority to ride that wave. A large number of surfers in the water at one time typically reduces the number of waves that each surfer can ride. Pressure from crowded lineups can lead to competition, aggression and a less enjoyable surfing experience.

d) Water Quality

Since surfers spend a lot of time in the ocean literally ingesting and absorbing the water, water quality is extremely important. Contaminated coastal waters often result in ear/nose/throat infections in surfers. It can also cause problems for open wounds or cuts inflicted in these contaminated areas. The ideal image in most surfer's minds includes pristine clean water.

e) Danger

Another factor to consider when choosing a surf spot is the relative danger. The most common worry being sharks or various sea life. Other people in the water can also be a concern. In some areas individuals feel a sense of ownership at a particular break and discourage other surfers from coming there. When traveling, surfers need to consider the stability of that country and whether being a foreigner makes them a target for crime.

f) Cost

The cost of travel is a big factor for many surfers. Since there are no large scale studies on surf tourists it is difficult to quantify how important cost is when choosing a location. It probably differs based on certain demographic criteria and the nature of the trip (i.e. purely for surfing or site-seeing too).

g) Bali's Appeal

In 2012 the highest number of international tourists entered Indonesia at the airport in Bali.[212] This demonstrates that Bali is still considered the top vacation destination in Indonesia. The Indonesian government does not, however, track why people are visiting. The labor statistics give some indication of how important tourism related activity is to Bali. In 2011 more people were employed by the category that encompasses wholesale trade, retail trade, restaurants and hotels than any other sector.[213]

The opportunity for excellent surf in Indonesia is magnified by the fact that it has 17,508 islands,[214] giving it the second longest coastline in the world.[215] The southern side of Bali is positioned to receive relatively unimpeded open ocean swells from storm systems to the south. The quality and consistency of waves in Bali is a major draw for surfers. Bali's most well-known and popular surf spots are on the Bukit Peninsula on the southern side of the island (see Figure 24). Some of these waves, such as Uluwatu, have gained iconic status on par with Pipeline on the north shore of Oahu. In fact Uluwatu and Padang-Padang are currently being considered for World Surfing Reserve status.[216] This designation is given to exceptional waves and "serves as a global model for preserving wave breaks and their surrounding areas by recognizing the positive environmental, cultural, economic and community

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[212] "Statistik Indonesia 2012," *Badan Pusat Statistik*: 329, accessed October 18, 2013, http://www.bps.go.id/eng/hasil_publikasi/si_2012/index3.php?pub=Statistik%20Indonesia%202012.

[213] Ibid.

[214] "The World Factbook – Indonesia," *Central Intelligence Agency*, accessed October 4, 2013, https://www.cia.gov/library/publications/the-world-factbook/geos/id.html.

[215] "Coastline Lengths," *World by Map*, accessed October 4, 2013, http://world.bymap.org/Coastlines.html.

[216] "Nominated Reserves," *World Surfing Reserves*, accessed November 1, 2013, http://www.worldsurfingreserves.org/nominated.

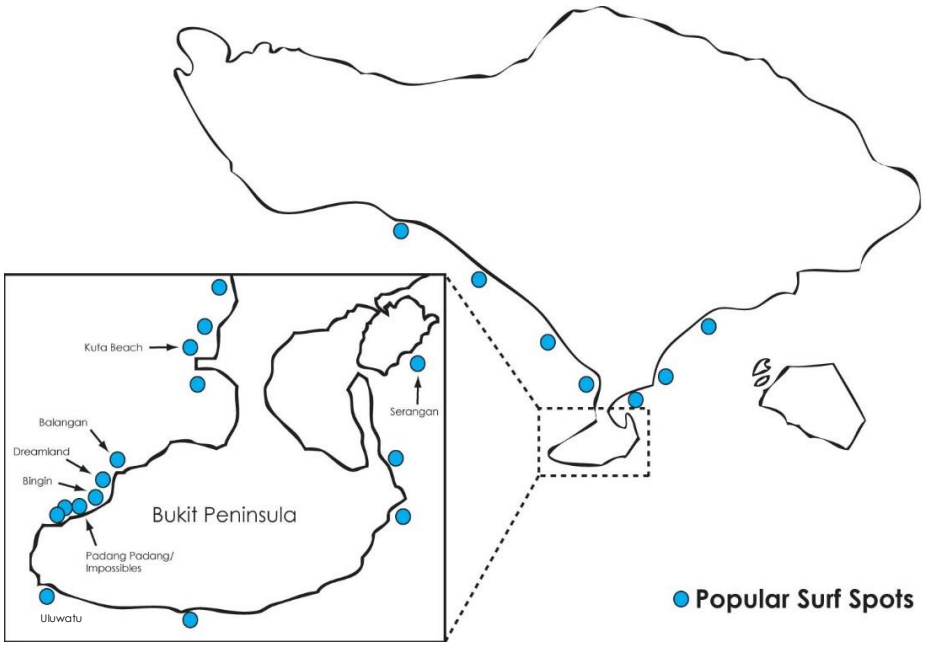

Figure 24. Bali's Most Popular Surf Spots – Authors own, adapted from Lueras (2002, p. 64-65) and www.surfline.com

benefits of surfing areas."[217] These perceived benefits are obviously biased towards keeping surfing waves unaltered and depend a great deal on how surfers and locals interact with each other and the proximal environment.

Bali has an advantage in several of the criteria for optimal surf listed above. The waves on the Bukit Peninsula are relatively accessible with at least dirt roads to most spots. If they are at the base of a cliff there is usually a staircase or path that provides access. Shark attacks are rare in this area. Despite the terrorist attacks in Bali in 2002 and 2005, people still perceive it as a relatively safe place to visit. Relatively inexpensive prices for foreign tourists are also a draw for Bali.

The other two factors, crowds and water quality, vary across Bali's surf breaks. The more accessible and less dangerous waves are becoming increasingly crowded according to locals and surf tourists with whom I spoke – those surfers having visited Bali numerous times over many years. Even some breaks that require

[217] "About World Surfing Reserves," *World Surfing Reserves*, accessed November 1, 2013, http://www.worldsurfingreserves.org/about.

a higher level of skill, such as Uluwatu, have become crowded during the high season. Water quality is generally poor in Bali. This is discussed in more detail below.

C. Qualitative

1. Survey of Surf Tourists

I visited Bali in January and February of 2015 for several weeks and talked with many local Indonesians, foreigners living on Bali and tourists which gave me more of an insider's perspective on the conflicting interests in Indonesia. This trip also gave me the opportunity to see the effects of tourism, specifically surf tourism, on the coastal development. Observing the buildings, infrastructure and environment has been incredibly valuable toward my understanding of the way Bali has developed.

As mentioned earlier, Bali is approaching a critical state due to freshwater supply and quality. The water issue that is pertinent to this research is the state of Bali's coastal ocean zone. Testing by the Bali Environment Agency shows that physical, chemical and microbiological contamination has made the waterways a health hazard.[218] As Oliver Crowell from Project Clean Uluwatu told The Jakarta Post, many surfers at the famous Uluwatu break have gotten severe infections and typhus.[219] Many surf tourists I talked with believed they became sick from surfing in contaminated water. I observed an alarming amount of trash in the ocean and on the beach at Kuta and Padang Padang. The rest of my survey sites had visible trash but to a lesser degree.

The infrastructure is in need of large scale upgrades in order to accommodate the residential and tourist population. I did not see any storm drains throughout Bali. I visited during the rainy season and observed a lot of flooding on the main roads which caused havoc. There is also a huge problem with garbage on Bali. Adequate collection services appear to be lacking. I witnessed people burning trash, including plastic, in their yards or vacant lots. Some residents told me that they have to pay

[218] Desy Nurhayati, "Surf Spots Polluted with Waste," *The Jakarta Post,* February 13, 2014, accessed December 20, 2015, http://www.thejakartapost.com/news/2014/02/13/surf-spots-polluted-with-waste.html.
[219] Ibid.

for collection services. Many people cannot afford to have garbage hauled away. Hauling the garbage to the landfill in southern Bali may not be an improvement. The landfill is open to the elements and located next to a mangrove forest and the ocean.

I also found that while Indonesia does have a building permit system it is not always followed. There are many informal/illegal structures that don't exist in the official records. Talking with some expatriates that built homes and businesses in a popular surf area I was informed that they did not get official building permits. Instead, they talked with the local *banjar,* village leader, in order to get permission to build and paid a fee as custom dictates. While this system has worked for Bali for many years, it makes it difficult to determine the true scope of development and consequently the demands on resources and infrastructure.

a) Results

An essential component of my doctoral project research is qualitative data. Surveying surf tourists shed some light on their basic demographics, habits when traveling, spending, factors that are most important to them when choosing a destination and their perceptions of Bali. There is limited data available on surf tourism that is regional or island specific; no data exists about Bali as far as I know. Face to face interaction on Bali allowed me to survey the surf tourists I could not have reached from Hawaii. It also enabled me to talk with them surfer to surfer. I felt this approach would offer more insight because those surveyed would be more candid and honest with a fellow surfer as opposed to an "academic researcher."

(1) Survey Protocol in Bali

This survey was classified as exempt from federal regulations pertaining to the protection of human research participants by the University of Hawaii Human Studies Program. The survey questions were formulated to reduce the likelihood of revealing any personally identifiable information about survey participants. The survey consent forms and questions were translated into the native languages of the four largest international groups to tour Bali as of 2013 (Australian, Chinese, Japanese and Malaysian). Most respondents used the English version. Surveys were handed out in person on Bali at various surf spots between January and February 2015. Upon completion the surveys were returned to me. The surveys were given to

women and men that I observed surfing off Bali who were at least 18 years of age and who did not reside on Bali. This protocol was deemed optimal because it eliminated potential respondents who were not relevant to the research. Surfers of all skill levels were selected to fill out a survey since surf tourism encompasses the entire spectrum of surf experience from the novice to the expert.

Survey locations were selected based on swell direction and conditions that predicted a larger tourist turnout. Popular surf areas were thus favored over the more remote or hard to access areas. Surveys were given at the following surf breaks around southern Bali (see Figure 25):

1. Kuta Beach
2. Balangan
3. Dreamland
4. Bingin
5. Padang Padang/ Impossibles
6. Serangan

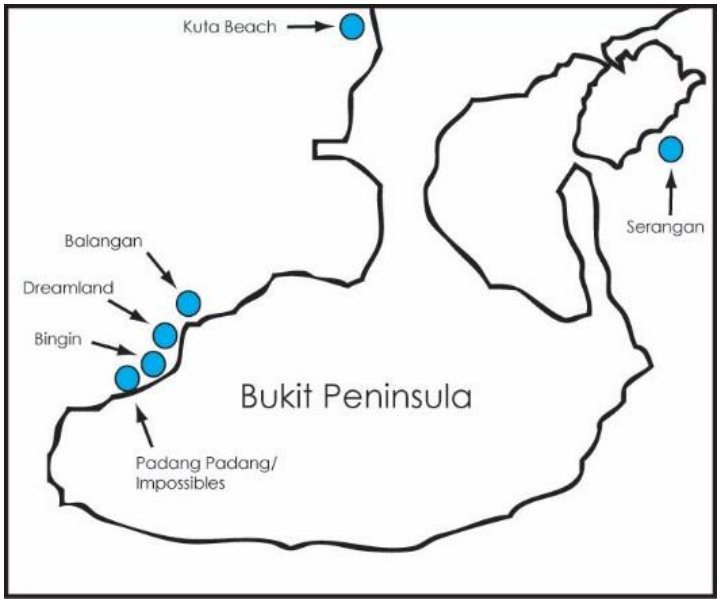

Figure 25. Location of Survey

There were a total of 61 surveys completed. The majority of respondents were surveyed at Bingin (15), Padang Padang/ Impossibles (15), Kuta Beach (14) and Serangan (12).

Survey results were analyzed for trends and significant differences. The survey results were entered into an Excel spreadsheet which was then imported into a statistical analysis program (Stata 14.0). The tests run were based on the data type. Ordinal data, which rates the importance of certain factors from Unimportant to Very Important on a five point Likert scale, was evaluated using the Kruskal-Wallis Equality-of-Populations Rank Test. Interval and nominal data was evaluated with a two-sample Wilcoxon Rank-Sum test. The threshold for a statistically significant difference was a probability of less than .05. Questions that were not answered were excluded in the tests. Percentages are based on the total number of questions answered. Since the sample size is small, several tests were run grouping the respondents' countries of residence into the following regions:

Africa – Morocco
Asia – China, Japan, Singapore
Eastern Europe – Russia
North America – United States of America
Oceania – Australia
South America – Argentina
Western Europe – Austria, Finland, France, Germany, Italy, Netherlands, Portugal, Slovenia, Spain, Sweden, Switzerland, United Kingdom

(2) Revised Protocol - Online

I suspected the people who responded on the 'in person' survey on Bali were not a representative example of my target group. My target respondents were surfers who travel specifically for surf (surf tourists). The high season for surf tourism in Bali is June – August when the waves are the best. Due to Indonesian research visa logistics I was only able to go in January and February. After talking to the survey respondents I concluded that most of them were just on vacation and decided to surf too; as opposed to someone who goes to Bali specifically to surf. I conducted an online survey seeking a larger pool of respondents who would be a more representative sample of the surf tourist group.

The online survey asked the same questions as the 'in person' paper survey and was also deemed exempt from federal regulations pertaining to the protection of human research participants by the University of Hawaii Human Studies Program. Questions were grouped into both general surf tourist and Bali specific questions. A link to the survey was sent to friends who surf and posted to the following surf oriented websites:

1) Facebook
    a) AccesSurf
    b) Coastal Watch
    c) Eastern Surf Magazine
    d) Hawaii Friends Group
    e) Save the Waves
    f) Surfer
    g) Surfers Against Sewage
    h) Surfing the Nations
    i) Surfing
    j) Surfrider Oahu
    k) Surfrider
    l) Sustainable Coastlines Hawaii
    m) Swell TV Surf Camp
    n) The Inertia
2) Surf News Network

As of November 20, 2015 there were 113 respondents who surf and are over 18 years old who completed the survey. If a person answered that they did not surf they were automatically routed to a Thank You page and blocked from any additional questions. Likewise, a person answering that they were under 18 years old was routed out of the survey per federal regulations protecting vulnerable groups in human research studies. Some respondents only completed the first few questions, however, I have included these partial responses in the results because that data is still useful. Out of those who answered about half (52%) have been to Bali.

(3) Analysis (see Appendix B & C)

(a) General

In general the results from the paper survey and online survey agreed. This was somewhat surprising since I thought that the paper survey respondents were not a representative example. The total number of respondents, however, is still a very small number when compared to the number of surfers in the world. This points to the need for a large scale study in order to understand this special tourist group and to gauge the true impact that they have on various surf destinations.

Most of the respondents (44%) on the paper survey were 18-25 years old. The online survey attracted a slightly older respondent with the majority (48%) in the 26-35yr. age group, followed by the 36-45yr. group at 27%. The overwhelming majority of the respondents fell between the ages of 18 and 45 years on both the paper and online survey. There were few respondents in the 46-55, 56-65, and over 66 year old categories. Whether this is representative of the age demographic of the surfing population as a whole cannot be determined without a larger study.

The gender distribution was rather uneven. Men accounted for 77% of the paper survey sample group and 72% of the online survey, while women were the minority. I did not see or meet many female surfers while on Bali. This could be attributed to the time of year or possibly the global breakdown of male vs. female surfers. I can only speculate based on personal experience and observation that generally there are fewer female surfers and they don't take surf trips as often as men.

I was surprised by some of the results naming the countries of residence. There was a tie between the top two countries of Australia and Russia; both being at 15% of the respondents from the paper surveys. The Australians were expected; Russians were not. Australia's proximity to Bali and a long standing surf culture make it an obvious surf tourist group. Russian surfers, however, were not expected due to their historic lack of surf culture and access to waves. After talking with the Russian survey respondents my general impression was that they go to Bali for a vacation and learn to surf there. On subsequent vacations, the Russians keep surfing.

The online survey was filled out mostly by people in the USA at 45% of respondents. This is likely due to the fact that the survey was in English and the places where it was posted were websites that cater to the USA and Australia. The

second largest group was Germany at 13%. Since English is taught in German schools perhaps those respondents felt competent to fill out the survey. In order to truly capture the worldwide surf tourist demographics and preferences it would be necessary to present a survey that could be easily translated into the world's major languages.

An overwhelming majority, 90% on the paper survey and 96% online, did not book their trip to Bali through a tour operator. This has significant implications for data collection and marketing to surfers. Any destination hoping to attract or maintain its level of surf tourists needs to consider avenues outside traditional tour companies. The survey responses strongly suggest that surfers tend to prefer the freedom of planning their own trip and maintaining flexibility to adjust to the changing surf conditions and personal preferences.

The survey respondents tend to take surf trips often. On both the paper and online survey (34% and 42%, respectively) they indicated they take vacations where surfing is the primary motivation and they are away from home at least 1 night but not more than 3 months 'more than once per year.'

An attempt was made to quantify the economic impact that surf tourism has on Bali using the survey answers. A rudimentary calculation was only possible on the paper survey results. Respondents were asked how much they spent on Bali per person per day, excluding airfare. They were also asked how long they stayed on Bali. Finally they were asked how often they take surf trips. Even though the most common spending range (41%) was a modest 300,000 - 600,000 IDR, the amount of time spent on Bali was rather long with the majority of people (46%) staying more than 4 Weeks. A simple calculation was performed comparing the lowest spending/ shortest length of stay to the highest spending/longest length of stay. The resulting range, although imprecise, does give a general sense of surf tourist spending (see Table 1). The most common spending range was 0 – 8,400,000 IDR Plus (21%). Based on the currency exchange at the time (January and February of 2015) 0 – over 700 USD was the equivalent. Factor in the frequency of surf tourist trips and the overall impact could be significant (see Table 2). Surveys on a much larger scale would give a more accurate estimate of the true economic impact that surf tourism has had on Bali.

Table 1. Calculated Amount Spent per Trip (Bali)

Amount Spent per Trip (IDR)	Count	% by Amt Spent per Trip
0-4,200,000	1	2%
0-8,400,000	3	5%
0-8,400,000 Plus	13	21%
0-14,400,000	2	3%
2,100,000-8,400,000	4	7%
4,200,000-8,400,000	2	3%
4,200,000-8,400,000 Plus	1	2%
4,200,000-16,800,000	10	16%
8,400,000-16,800,000 Plus	12	20%
8,400,000-25,200,000	4	7%
8,400,000-33,600,000	4	7%
16,800,000-50,400,000	2	3%
16,800,000-33,600,000 Plus	2	3%
84,000,000 Plus	1	2%
Total:	**61**	**100%**

Table 2. Frequency of Surf Trips (Bali)

Frequency Surf Trips	Count	% by Frequency
More than once per year	21	34%
Once per year	19	31%
Once in 3 years	4	7%
Once in 5 years	0	0%
Once in 10 years	2	3%
Less than once in 10 years	4	7%
Never	11	18%
Total:	**61**	**100%**

(b) Accommodations

In order to understand which factors were considered when a surf tourist selected accommodations I asked them to rank eight choices from Unimportant to Very Important on the paper survey. The factor that was ranked as Very Important by the majority of people (44%) was price. That ranking may have been due to the participants being more budget conscious travelers. Bali, in general, attracts visitors because of its relatively inexpensive prices when compared to other tropical destinations. The online survey respondents ranked price as Somewhat Important at 42%, followed closely by Very Important at 41%. Clearly this group is concerned about costs when traveling.

The majority of online survey respondents (54%) ranked proximity to surf breaks, as Very Important. The online survey seems to have reached the more hard core surfers since the proximity to breaks was highly ranked. Most of the paper survey respondents (36%) ranked this as Somewhat Important.

Five of the factors (service; safety; amenities; aesthetics; reviews or recommendations) were ranked as Somewhat Important by the majority of respondents in both the paper and online surveys which is significant for any hotel wishing to attract surf tourists. All of those factors, except reviews, can be controlled through the placement and design of the building as well as the operations of the accommodations.

The last factor, proximity to shopping, restaurants and nightlife, had a small variation from the paper to the online surveys. The paper survey respondents ranked those items as Somewhat Important at 32% of the total. Of the online survey respondents 28% came in as Somewhat Important. Results favor a more developed area over a remote or undeveloped region. In the case of Bali, most of the well-known surf breaks already have some development around them with access to restaurants at least.

(c) Surf Vacation

The survey asked participants to rank fourteen factors from Unimportant to Very Important when choosing a destination for a surf vacation. Wave quality was ranked as Very Important by the majority of respondents in both the paper and

online survey with 54% and 57% of total responses, respectively. This is a positive for Bali which has many excellent waves around the island. There is, however, increasing competition around the world with rideable surf breaks being discovered regularly.

The other factors that were ranked as Somewhat Important by the majority of both the paper and online respondents are: friendly locals, lack of crowds at the surf breaks, safety (personal & property), price, weather, unique culture, health (clean water, low pollution), reviews or recommendations, and availability of a variety of non-surfing activities. The areas of concern such as clean water and low pollution require intervention on a large system-wide scale; however, small villages or even individual hotels could help to improve these things. Concerns over pollution were mentioned numerous times in participant responses to the question regarding visiting Bali again. Since surfers are spending so much time in the ocean, water quality is extremely important.

Unknown (unpopular) surf breaks, well known (popular) surf breaks, and modern amenities were all ranked as Neutral by the majority of respondents. A noteworthy result is that both categories of surf breaks were ranked the same. Results were broken down by region and addressed below. The lack of strong opinion for or against modern amenities suggests that a surf tourist does not require the most advanced technology or all the bells and whistles when choosing a location for their stay. This group is not looking for the same things as a luxury traveler.

The paper and online respondents had an interesting split when it came to the proximity to home. Most of the paper respondents (31%) felt Neutral about it with Somewhat Important trailing at 28%. The online respondents ranked proximity as Unimportant at 29% with Neutral coming in second at 26%. Again I think this could be a divide between the more hard core surfer and the casual surfer. Available vacation time would also factor in since longer travel times would limit possible destinations.

(d) Surf Fee

The survey question that generated the most interest and debate from the respondents was "Would you be willing to pay a fee to surf a break if it limited the

number of surfers allowed in the water at one time? Why or why not?" I included this question because any surf destination considering a surf fee model will need to carefully weigh both sides of the argument. Fees have been adopted in many places around the world to different degrees and varying success. Whether or not this approach would be both appropriate and helpful for a particular location must be decided by all of the stakeholders who will be impacted by surf tourism.

The question "surf fees?" inspired very passionate responses. Most of the respondents, 61% for both the paper and online survey, answered "No". The most common reason given revolved around the basic belief that surfing should be free because the ocean is for everyone. This sentiment is deeply rooted and is most likely the result of a European ideology that the ocean cannot be owned by one group.[220] There are, however, many cultures around the world that recognize the ownership rights of a group or family that extends from the land out into the ocean.[221] They consider all of the resources in that section of ocean as belonging to those people; by extension the wave resources would belong to them as well. Such beliefs are a fundamental construct which governs ownership and resource management in every society and is passed down through generations. Any attempt to persuade people to alter their point of view on a right considered primary and indisputable would be extremely challenging.

Some respondents said they would be willing to pay a surf fee. They believed paying a fee would provide a better surf experience from getting more waves to feeling safer. A few people also said they felt a fee would be a good idea if it helps support the local economy, preservation and/or maintenance of the beach and ocean. If surf tourists knew their money would be going towards protecting the ocean, improving water quality and providing safety, such as lifeguards, they might be more receptive to such a fee. The rules and logistics could get complicated,

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[220] Ralf Buckley, "Surf Tourism and Sustainable Development in Indo-Pacific Islands," *The Journal of Sustainable Tourism,* Vol. 10, No. 5 (2002): 421, accessed March 9, 2013, http://www98.griffith.edu.au/dspace/bitstream/handle/10072/6732/19530.pdf?sequence=1.

[221] Ibid., 415.

however, and there would need to be provisions that decrease conflicts between locals and tourists.

(e) Visit Bali Again

When asked whether they would visit Bali again, an overwhelming majority (95% on paper survey, 87% on online survey) said that they would. When asked "Why or Why Not?" there were four reasons that were most often cited among those who would visit again: good surf, nature/climate, friendly locals, and inexpensive cost. Through my experiences as a traveling surfer and talking to other surfers wherever I go, I can make a reasonable assumption that these factors are also important to the majority of the surf tourist population. While good surf and the nature or climate of a place are mostly fixed, the other two attributes are changeable over time. The local population's attitude towards tourists is interwoven with many components such as the economy and whether they perceive changes to their culture and land as positive or negative. Cost variables related to currency exchange and Indonesian government regulations within the tourism sector can also affect repeat business.

Although people said they would visit again, the negative factors mentioned repeatedly in the online survey are overcrowding, pollution and too much development. Several people said they would only use Bali as a jumping off point to visit other Indonesian islands. If the government hopes to keep or increase the number of surf tourists coming to Bali these concerns must be taken seriously or Bali will be replaced by other destinations.

(4) Significant Differences in Bali Paper Survey

(a) Gender

Gender was tested across multiple variables to determine if a statistically significant difference in preferences exists between male and female surfers. The data, however, may be skewed by the fact that the number of male vs. female respondents was quite unequal (77% and 23%, respectively). Women placed a higher value than men on the importance of price when choosing accommodations and destination on the Likert scale. Men placed a higher value than women on the importance of unknown (unpopular) surf breaks when choosing a destination. Gender

preferences would be more significant with a larger survey pool and a more even number of men and women.

(b) Age

When age groups were compared to other variables the only significant difference was in the importance placed on the proximity of accommodations to shopping, restaurants and nightlife. Because the difference in probability was less than .05, the Kruskal-Wallis Equality of Populations Rank Test could not determine which age group had the strongest ranking. Some insight, however, can be gained from looking across all age groups. The most common ranking was Somewhat Important (see Table 3).

Table 3. Proximity by Age Group (Bali)

	Answer: Proximity Other	**Count**	**% by Age Group**
18-25	Unimportant	2	7%
18-25	Somewhat Unimportant	3	11%
18-25	Neutral	7	26%
18-25	Somewhat Important	13	48%
18-25	Very Important	1	4%
18-25		1	4%
	Total:	**27**	**100%**
26-35	Unimportant	4	21%
26-35	Somewhat Unimportant	6	32%
26-35	Neutral	6	32%
26-35	Somewhat Important	2	11%
26-35	Very Important	1	5%
	Total:	**19**	**100%**
36-45	Unimportant	3	21%
36-45	Somewhat Unimportant	1	7%
36-45	Neutral	3	21%
36-45	Somewhat Important	4	29%
36-45	Very Important	3	21%
	Total:	**14**	**100%**
66 or older	Unimportant	1	100%
	Total:	**1**	**100%**

(c) Region

The regional comparison resulted in several statistically significant differences. The Kruskal-Wallis Equality-of-Populations Rank Test was used and determined that there was a difference between regions when ranking the importance of reviews or recommendations for choosing accommodations. The data, however, may be skewed by the small number of respondents. The majority of respondents ranked the reviews as Somewhat Important or Very Important. Only the respondents from Africa and South America ranked reviews as Unimportant. Results point to the growing influence of travel review websites, as well as old fashioned word of mouth (see Table 4).

Table 4. Reviews by Region (Bali)

Region	Answer: Reviews	Count	% by Region
Africa	Unimportant	1	100%
	Total:	**1**	**100%**
Asia	Somewhat Unimportant	1	33%
Asia	Somewhat Important	2	67%
	Total:	**3**	**100%**
Eastern Europe	Neutral	2	22%
Eastern Europe	Somewhat Important	2	22%
Eastern Europe	Very Important	5	56%
	Total:	**9**	**100%**
North America	Somewhat Important	1	25%
North America	Very Important	3	75%
	Total:	**4**	**100%**
Oceania	Somewhat Unimportant	1	11%
Oceania	Neutral	2	22%
Oceania	Somewhat Important	5	56%
Oceania	Very Important	1	11%
	Total:	**9**	**100%**
South America	Somewhat Unimportant	1	100%
	Total:	**1**	**100%**
Western Europe	Unimportant	4	13%
Western Europe	Somewhat Unimportant	2	6%
Western Europe	Neutral	7	22%
Western Europe	Somewhat Important	13	41%
Western Europe	Very Important	6	19%
	Total:	**32**	**100%**

There was also a significant difference among regions according to the Kruskal-Wallis test when ranking the importance of unknown (unpopular) surf breaks for choosing a destination. Responses ranged from Unimportant to Somewhat Important (see Table 5). An interesting point emerges if one compares these results to the importance of popular surf breaks when choosing a destination (see Table 6). The Oceania group marked popular breaks as only Somewhat Important, perhaps because the Oceania group includes Australia, where surfing is a very popular sport and thus overcrowding in the breaks is an issue.

A casual observer might expect the respondents to rank these two factors on opposite ends of the scale, however, most of the groups did not. As a surfer will understand, the results make sense because a person in the course of a surf vacation will most likely want to visit the famous surf breaks that they have seen in photos and videos as well as seeking out lesser known breaks in order to avoid crowds and in the spirit of adventure.

Table 5. Unpopular Breaks by Region (Bali)

Region	Answer: Unpopular Breaks	Count	% by Region
Africa	Unimportant	1	100%
	Total:	**1**	**100%**
Asia	Neutral	1	33%
Asia	Somewhat Important	2	67%
	Total:	**3**	**100%**
Eastern Europe	Unimportant	1	13%
Eastern Europe	Somewhat Unimportant	1	13%
Eastern Europe	Neutral	5	63%
Eastern Europe	Somewhat Important	1	13%
	Total:	**8**	**100%**
North America	Unimportant	1	25%
North America	Neutral	1	25%
North America	Somewhat Important	1	25%
North America	Very Important	1	25%
	Total:	**4**	**100%**
Oceania	Neutral	2	22%
Oceania	Somewhat Important	4	44%
Oceania	Very Important	3	33%
	Total:	**9**	**100%**
South America	Neutral	1	100%
	Total:	**1**	**100%**
Western Europe	Unimportant	1	3%
Western Europe	Somewhat Unimportant	2	7%
Western Europe	Neutral	15	50%
Western Europe	Somewhat Important	11	37%
Western Europe	Very Important	1	3%
	Total:	**30**	**100%**

Table 6. Popular Breaks by Region (Bali)

Region	Answer: Popular Breaks	Count	% by Region
Africa	Somewhat Unimportant	1	100%
	Total:	**1**	**100%**
Asia	Somewhat Unimportant	1	33%
Asia	Neutral	1	33%
Asia	Somewhat Important	1	33%
	Total:	**3**	**100%**
Eastern Europe	Unimportant	3	33%
Eastern Europe	Neutral	3	33%
Eastern Europe	Somewhat Important	2	22%
Eastern Europe	Very Important	1	11%
	Total:	**9**	**100%**
North America	Unimportant	1	25%
North America	Neutral	1	25%
North America	Somewhat Important	1	25%
North America	Very Important	1	25%
	Total:	**4**	**100%**
Oceania	Somewhat Unimportant	1	11%
Oceania	Neutral	4	44%
Oceania	Somewhat Important	3	33%
Oceania	Very Important	1	11%
	Total:	**9**	**100%**
South America	Neutral	1	100%
	Total:	**1**	**100%**
Western Europe	Unimportant	3	10%
Western Europe	Somewhat Unimportant	4	13%
Western Europe	Neutral	16	52%
Western Europe	Somewhat Important	8	26%
	Total:	**31**	**100%**

The last factor that had a statistically significant difference by region according to the Kruskal-Wallis Equality-of-Populations Rank Test was the importance of culture when choosing a destination for a surf vacation. Again there is a need to examine the data further since we cannot draw conclusions from this test alone. The majority of respondents in all regions ranked culture as Neutral or Somewhat Important (see Table 7). More than half of the targeted group (58%) said that surfing was their primary motivation for visiting Bali so one may surmise that the culture does not play a primary role in their decision. In order to get a more meaningful analysis I ran the two-sample Wilcoxon Rank-Sum Test comparing Oceania and Eastern Europe. This showed that respondents from Oceania placed a higher importance on culture when choosing a destination for a surf vacation. The Eastern European group ranked culture as Unimportant to Neutral. In contrast, the Oceania group had a wider range from Unimportant to Very Important, however, the majority (67%) chose Somewhat Important.

Table 7. Culture by Region (Bali)

Region	Answer: Culture	Count	% by Region
Africa	Somewhat Important	1	100%
	Total:	**1**	**100%**
Asia	Somewhat Important	2	67%
Asia	Very Important	1	33%
	Total:	**3**	**100%**
Eastern Europe	Unimportant	1	11%
Eastern Europe	Somewhat Unimportant	2	22%
Eastern Europe	Neutral	6	67%
	Total:	**9**	**100%**
North America	Unimportant	1	25%
North America	Neutral	2	50%
North America	Very Important	1	25%
	Total:	**4**	**100%**
Oceania	Unimportant	1	11%
Oceania	Neutral	1	11%
Oceania	Somewhat Important	6	67%
Oceania	Very Important	1	11%
	Total:	**9**	**100%**
South America	Somewhat Important	1	100%
	Total:	**1**	**100%**
Western Europe	Somewhat Unimportant	1	3%
Western Europe	Neutral	13	43%
Western Europe	Somewhat Important	13	43%
Western Europe	Very Important	3	10%
	Total:	**30**	**100%**

Visit Bali Again

A significant difference between those who would and would not visit Bali again was the importance they placed on wave quality. Those who would visit Bali again placed more importance on wave quality when choosing a destination for a surf vacation (see Table 8). Of those who would visit again, 58% thought wave quality was Very Important. Bali's many high quality waves will be significant for attracting repeat surf tourists. Those who would not visit Bali again rated wave quality as Somewhat Important.

Table 8. Wave Quality by Visit Again (Bali)

Visit Bali Again	Answer: Wave Quality	Count	% by Visit Again
Yes	Unimportant	1	2%
Yes	Neutral	5	9%
Yes	Somewhat Important	17	31%
Yes	Very Important	32	58%
	Total:	**55**	**100%**
No	Unimportant	1	33%
No	Somewhat Important	2	67%
	Total:	**3**	**100%**

(d) Amount Spent

One question on the survey asked participants to estimate how much money they spent in Bali per person per day, including accommodations, food, ground transportation, tours and souvenirs; excluding airfare. Those who spent less placed more value on price when choosing their accommodations. Examining the data we see that the majority of people in both spending groups said that price was Very Important, however, the 300,000 – 600,000 IDR group was not as heavily weighted in that answer (see Table 9).

Table 9. Price by Amount Spent (Bali)

Amount Spent	Answer: Price	Count	% by Amt Spent
0 - 300.000 IDR	Unimportant	1	6%
0 - 300.000 IDR	Somewhat Important	2	12%
0 - 300.000 IDR	Very Important	14	82%
	Total:	**17**	**100%**
300.000 - 600.000 IDR	Unimportant	1	4%
300.000 - 600.000 IDR	Somewhat Unimportant	1	4%
300.000 - 600.000 IDR	Neutral	4	16%
300.000 - 600.000 IDR	Somewhat Important	9	36%
300.000 - 600.000 IDR	Very Important	10	40%
	Total:	**25**	**100%**

b) Summary

1. Not using tour operators
2. Small groups more prevalent
3. Take surf trips often (typically more than once per year)
4. Adverse to surf fee
5. Factors when choosing a surf destination

Very Important:

- Wave quality

Somewhat Important:

- Friendly locals
- Lack of crowds at the surf breaks
- Safety (personal & property)
- Price
- Weather
- Unique culture
- Health (clean water, low pollution)

- Reviews or recommendations
- Availability of a variety of non-surfing activities

Neutral:

- Unknown/ unpopular breaks
- Well-known/ popular breaks
- Modern amenities

Neutral/ Unimportant:

- Proximity to home

6. Factors when choosing accommodations

Very Important/ Somewhat Important:

- Price
- Proximity to surf breaks

Somewhat Important:

- Service
- Safety (personal & property)
- Amenities (parking, pool, wifi, restaurant, etc.)
- Aesthetics (architecture, decor, grounds)
- Reviews or recommendations

Somewhat Important/ Neutral:

- Proximity to shopping, restaurants, nightlife
- Long trips to Bali
- Surfing is main reason for visiting Bali
- Spending a low amount in Bali
- Would visit Bali again because of good surf, nature/climate, friendly locals, and inexpensive cost

D. Case Studies

Factors surrounding surf tourism are location, economic and cultural impact and ultimately whether it will be sustainable. This report will analyze several of those factors as case studies in which to learn about both successes and failures. The first will focus on the sustainability aspects of developing a resort on an island. I have chosen Bintan Island, Indonesia since it is being marketed as an "eco-island". The second case study will look at policies specifically related to surf tourism. Papua New Guinea has implemented a surf management plan that is a unique approach to surf tourism. The rest will evaluate the functionality of accommodations from a surf tourist viewpoint, materials and sustainable practices.

1. Bintan Island, Indonesia

Sustainability is a popular buzzword on everyone's lips. What does it mean, really? How does it manifest when promoting tourism development? Is it possible to have a successful business now and conserve resources for the future? The United States Environmental Protection Agency's definition is appropriate for this analysis:

> Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations. Sustainability is important to making sure that we have and will continue to have, the water, materials, and resources to protect human health and our environment.[222]

This definition of sustainability is particularly interesting when applied to development meant to attract and accommodate tourists. Tourism itself can be viewed as unsustainable due to the associated carbon footprint when the masses journey far from their home. Despite this fact, many tourists are seeking locations and accommodations that they perceive as more responsible to the local people and the natural environment.

[222] "Sustainability," United States Environmental Protection Agency, accessed October 10, 2014, http://www.epa.gov/sustainability/basicinfo.htm.

The Bintan Eco Island study is analyzed solely from a sustainability perspective. While the focus of this thesis is not ecotourism, per se, many surf tourists are expressing concern about the impact they have on their destination. That fact coupled with my strong belief that all development should strive to be efficient and conservative in its use of resources makes this a useful tool when designing surf tourist accommodations. Bintan Eco Island is a good example of an attempt to balance a profitable development with sustainability.

Bintan Island is in the Riau Archipelago in Indonesia close to Singapore. Proximity to this densely populated and affluent island nation has spurred the drive for development on Bintan. The Indonesian and Singaporean governments have agreed to make the Riau Islands a free trade zone and to develop them jointly.[223] Bintan Resorts International is responsible for 200 square kilometers on the northern side of the island (see Figure 26 Top).[224] This is a large scale phased plan that is branding itself as a model for ecotourism and sustainability. Bintan Resorts International has set a goal of 1 million visitors by the year 2015.[225] In order to accommodate this number of visitors, the plan includes infrastructure and transportation. The developers are trying to avoid the problems that have plagued other islands due to a lack of planning.[226]

[223] Mark Dwyer, ed., *Bintan Eco Island Indonesia* (Madrid, Spain: Fundacion Metropoli, 2011), accessed November 1, 2013, http://lagoibaybintan.com/beyond-2015/, 10.
[224] Megan Gell, "Major redevelopment spans four bays, eco villages and more," CEI, August 2, 2012, accessed October 10, 2014, http://www.cei.asia/Article/310733,big-changes-ahead-for-bintan-island.aspx.
[225] Ibid.
[226] Ibid.

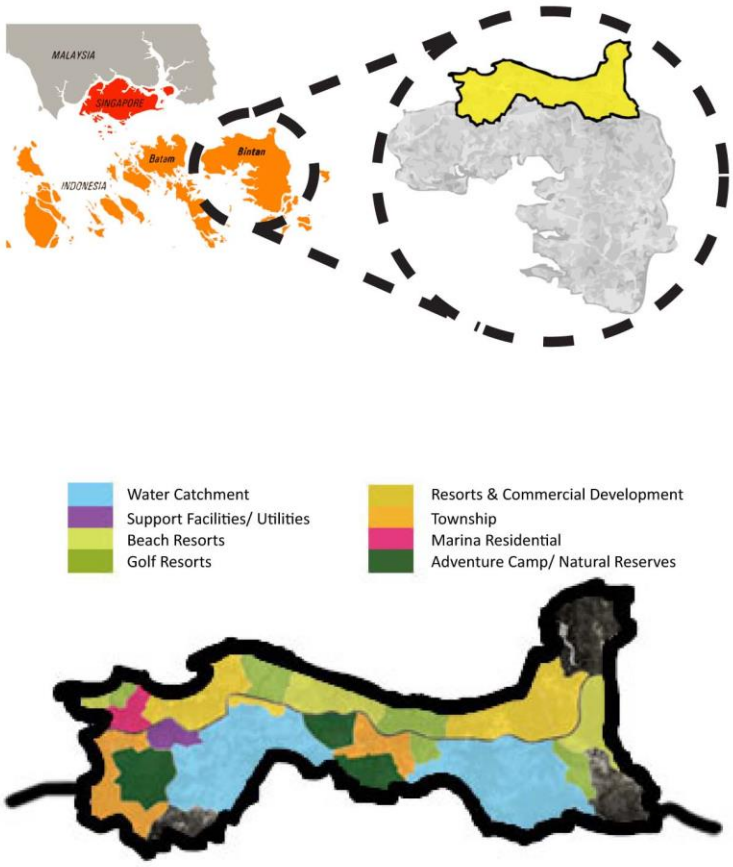

Figure 26. Top: Area Context Map (Reproduced from Bintan Eco Island Indonesia (2011, p. 10-11, modified)), Bottom: Land Use Plan (Reproduced from Bintan Eco Island Indonesia (2011, p. 17, modified))

The land use plan for the north side of Bintan Island is divided into 8 areas: water catchment, support facilities/utilities, beach resorts, golf resorts, resorts and commercial development, township, marina residential, and adventure camps/natural reserves (see Figure 26 Bottom).[227] In order to evaluate their land use decisions it is necessary to look at Bintan's plant life zones. Most of the island's mature forest was cut down for timber [228]and in order to grow Gambier, which was

[227] Mark Dwyer, ed., *Bintan Eco Island Indonesia* (Madrid, Spain: Fundacion Metropoli, 2011), accessed November 1, 2013, http://lagoibaybintan.com/beyond-2015/, 17.
[228] Ibid., 119.

used for leather tanning.[229] The region is dominated by secondary forest growth, followed by pioneer growth. The coastal areas that meet freshwater have mangrove forests (see Figure 27 Top).

When the land use plan is laid over the plant life zones a clearer picture emerges. There are two large water catchment areas inland which eliminate parts of the mature forest, secondary forest and the pioneer growth (see figure 27 Bottom). While the destruction of any mature forest is undesirable it appears the location of the water catchments try to avoid the more dense mature forest areas. The majority of cleared vegetation would be the secondary growth followed by the pioneer growth. The large size is no doubt in anticipation of the increasing number of visitors to the island as well as the typically large freshwater demands for resort development. The question is: does the benefit of having a local freshwater catchment system outweigh the destruction of forest? In this case I think that the availability of a dedicated freshwater supply for both the tourists and residents is the best option if it is designed thoughtfully.

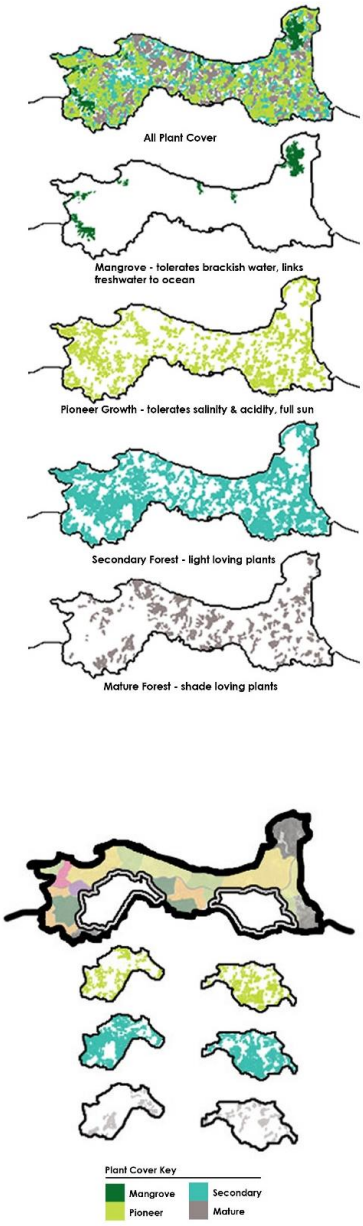

Figure 27. Top: Plant Cover - Author's own, adapted from Bintan Eco Island Indonesia (2011, p. 119), Bottom: Water Catchment Zone - Author's own, adapted from Bintan Eco Island Indonesia (2011)

[229] Mark Dwyer, ed., *Bintan Eco Island Indonesia* (Madrid, Spain: Fundacion Metropoli, 2011), accessed November 1, 2013, http://lagoibaybintan.com/beyond-2015/, 148.

The water catchment basin on the west side is located in the most logical place when taking into account the hydrology of the island. A large natural lake fed by rivers and linking to the ocean is in this area. Well thought out water catchment design is important because by its very nature it will hinder the natural flow of freshwater that feeds the various vegetation and mangrove forests. If there is no system in place to allow water to flow to the ocean, the island's natural system of checks and balances will be interrupted. As the report *Bintan Eco Island Indonesia* explains, the peat swamp forms when the sand, sediment, and debris collect in the mangrove forest and form a barrier between the brackish estuary water and the freshwater runoff (see Figure 28 Top).[230] These peat swamps are very important because they store a lot of carbon, therefore, they should not be destroyed.[231] Cutting off the flow of freshwater to these areas most certainly will prevent them from expanding and will probably end up destroying the habitat altogether.

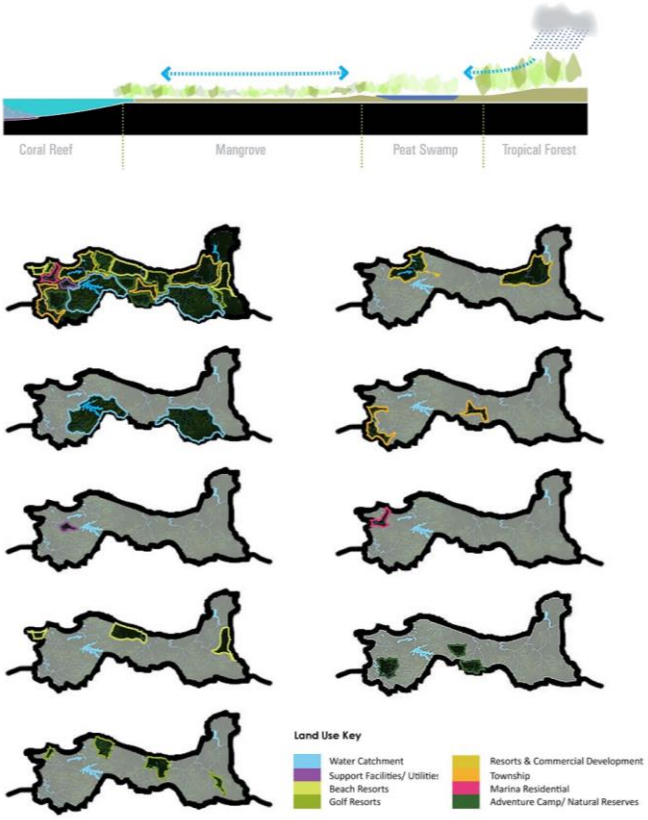

Figure 28. Top: Land Cover (Vegetation) (Reproduced from Bintan Eco Island Indonesia (2011, p. 118), Bottom: Land Use Zones Hydrology - Author's own, adapted from Bintan Eco Island Indonesia

[230] Mark Dwyer, ed., *Bintan Eco Island Indonesia* (Madrid, Spain: Fundacion Metropoli, 2011), accessed November 1, 2013, http://lagoibaybintan.com/beyond-2015/, 118.
[231] Ibid.

According to *Bintan Eco Island Indonesia* there is a plan "to provide adequate conservation surfaces around hydrologic features; first, to protect the ecosystems that rely on natural processes of purification (reef, mangrove, etc.), and second, to ensure that catchments around human-made reservoirs sufficiently filter rainfall, and do not host any land use based contaminants."[232] Analyzing the land use plan in relation to the natural hydrology points out areas of concern (see Figure 28 Bottom). Aside from the water catchment placement the other zone with a large impact is the resort and commercial development. This area on the northwest edge encompasses a large body of water within the development site as well as a river linking the estuary to the reservoir. Again the sustainable aspect will depend a great deal on how the area is developed and if it allows movement of the water through the area. The marina residential, township, adventure camp and nature reserve cover the other major river that links to the ocean on the west side of the site.

One development that is underway on the west side in the marina residential zone is Treasure Bay, Pesona Lagoi Bintan. This 338 hectare site aspires to be "the region's most iconic premier waterfront resort city" according to Paul Leong, Treasure Bay's COO.[233] This master plan covers an area with mangroves (see Figure 29 Top) and estuaries (see Figure 29 Bottom). Building a large mixed use development in an estuary is not a decision that respects the island's ecosystem. The preliminary renderings from the land developer show buildings along the coastline around the bay as well as over the water (see Figure 30). The golf course in close proximity to the estuary is also an unwise decision because of the herbicides and pesticides that

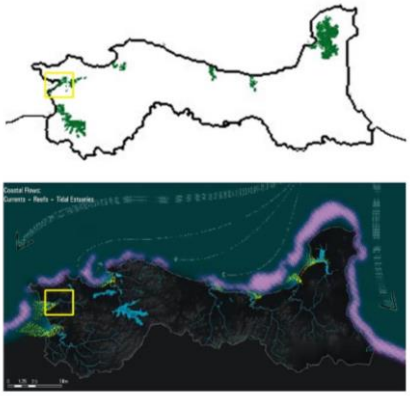

Figure 29. Top: Mangrove - Author's own, adapted from Bintan Eco Island Indonesia, Bottom: Currents, Reefs and Tidal Estuaries (Reproduced from Bintan Eco Island Indonesia (2011, p. 113, modified))

[232] Mark Dwyer, ed., *Bintan Eco Island Indonesia* (Madrid, Spain: Fundacion Metropoli, 2011), accessed November 1, 2013, http://lagoibaybintan.com/beyond-2015/, 146.
[233] Muhamad Al Azhari, "Malaysia's Landmarks to Invest $3.5b in 'Treasure Bay' Resort on Indonesia's Bintan Island," Jakarta Globe, May 11, 2014, accessed December 6, 2014, http://thejakartaglobe.beritasatu.com/business/malaysias-landmarks-invest-3-5b-treasure-bay-resort-indonesias-bintan-island/.

are commonly used which will run into the bay. When comparing that plan to the existing landscape it is hard to imagine that the unique ecosystem of the estuary and mangroves will not be severely disturbed.

Figure 30. Top: "Bintan Island" Google Earth, Bottom: Treasure Bay rendering (Landmarks.com)

The coral reefs around Bintan Island are also an important part of its ecosystem. They protect the island from waves, provide habitat for most of the fish in the region, and produce the sand.[234] According to a World Resources Institute report "nearly 95 percent of coral reefs in Indonesia are threatened by local human activities, with more than 35 percent in the high or very high threat categories."[235] The coral reefs along Bintan's north side are classified as being in the high to critical risk category from both local and global threats (see Figure 31). The main threats to coral reefs in Indonesia come from overfishing and destructive fishing, watershed based pollution, and coastal development.[236] Bintan is particularly vulnerable to the watershed based pollution as a result of deforestation and runoff from planned industries such as agriculture, wood processing, petroleum, and possibly mining.[237]

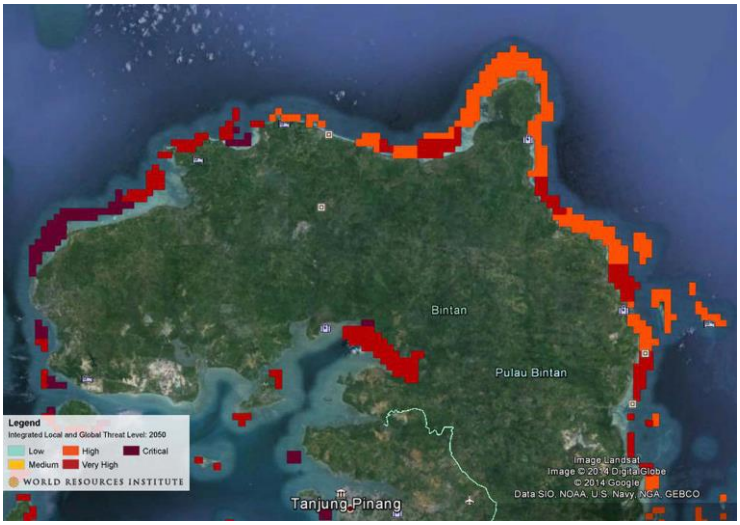

Figure 31. Local and Global Threats in 2050 to Corals (KML Data Set – Google Earth)

As mentioned above, the mangroves play an important part in the island's ecosystem. The two land use zones that infringe upon them the most are the marina residential zone and the adventure camp/nature preserve (see Figure 32). Bintan Resorts has set up a mangrove nursery and a mangrove restoration area that is not

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[234] Mark Dwyer, ed., *Bintan Eco Island Indonesia* (Madrid, Spain: Fundacion Metropoli, 2011), accessed November 1, 2013, http://lagoibaybintan.com/beyond-2015/, 112.
[235] Lauretta Burke et al., *Reefs at Risk Revisited in the Coral Triangle* (Washington, DC: World Resources Institute, 2012), accessed December 6, 2014, http://www.wri.org/publication/reefs-risk-revisited-coral-triangle, 27.
[236] Ibid., 27-28.
[237] Rodeo C. Cabillan, Leong Wen Shan, and Dinesh Naidu eds. *City Portraits: World Cities Summit Mayors Forum 2014* - Accessed December 10, 2014. http://www.worldcitiessummit.com.sg/reports-and-publication.

open to tourists in order to restore some of this vital habitat.[238] Aside from the mangroves, the marina residential also covers some of the mature forest. Hopefully the development will site buildings so that there is little need to cut down any of the mature forest. The adventure camp could be a low impact endeavor if it is designed to sit lightly on the land and minimize damage to the mangrove forest. The location of the nature preserve appears as if the planners tried to protect the most vulnerable and important habitat. Locating the nature preserve where the mangroves are concentrated was a good planning decision. Likewise, protecting areas in the middle of the development zone that are at a higher elevation will allow the mature forests to receive the rain water before it gets trapped in the water catchments.

The other land use zones have varying degrees of intersection with sensitive ecologies. Notably the beach resorts, golf resorts, resort and commercial developments (see Figure 32) collectively cover the northern coastline which has mature forests and some mangroves. Development pressure is the greatest in these

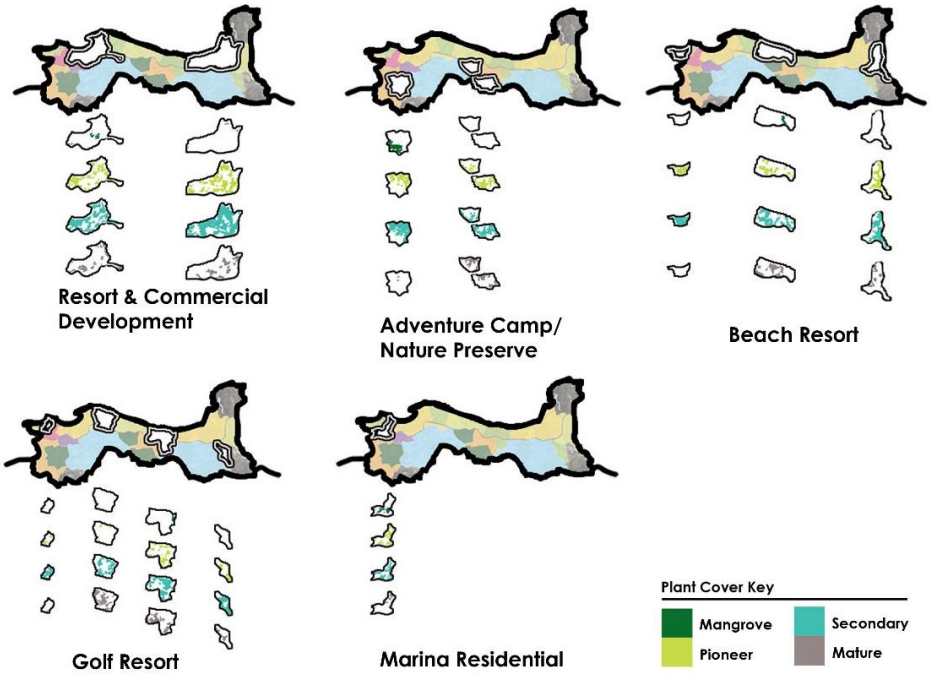

Figure 32. Land Use Zones - Author's own, adapted from Bintan Eco Island Indonesia

[238] "Conservation / Eco Initiatives," Bintan Resorts, accessed October 10, 2014, http://bintan-resorts.com/visitors/corporate-info/conservation-eco-initiatives/.

areas for tourism due to the desirable beaches, coastline and coral reefs just offshore. The scope and design decisions in these areas are critical to a sustainable future. One positive initiative in this area is turtle conservation. Bintan Resorts has partnered with the local community to protect the hawksbill turtles that nest on the island.[239]

The township and support facilities/ utilities zones (see Figure 33) are strategically located near the Bandar Bentan Telani ferry terminal on the west side of the island. The township on the west coast was originally a small village and now houses the majority of the workforce for Bintan Resorts.[240] This proximity to the tourist areas, with Treasure Bay just to the north, makes sense as far as minimizing local transportation needs. There is a plan to create "Eco-Villages" that "link the service economies of the entire island, creating local supply for the fluctuating demands created by Bintan tourism."[241] They are conceived of as villages revolving around the service sector, crafts and agriculture with a focus on testing new

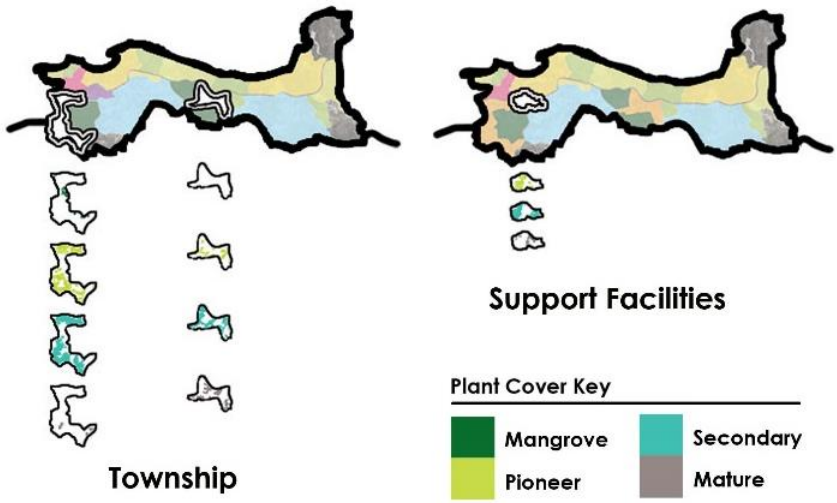

Figure 33. Township & Support Facilities / Utilities Zone - Author's own, adapted from Bintan Eco Island Indonesia

[239] "Conservation / Eco Initiatives," Bintan Resorts, accessed October 10, 2014, http://bintan-resorts.com/visitors/corporate-info/conservation-eco-initiatives/.
[240] Mark Dwyer, ed., *Bintan Eco Island Indonesia* (Madrid, Spain: Fundacion Metropoli, 2011), accessed November 1, 2013, http://lagoibaybintan.com/beyond-2015/, 179.
[241] Ibid., 161.

technologies.[242] These villages may also become sites for testing "Zero Buildings" which are experimental architecture with the goal of using no energy or water, and producing no waste or carbon dioxide emissions.[243]

The land development plan on the northern part of Bintan Island has some good ideas and some that are not. The large water catchment is reasonable from an anticipated development point of view but raises concerns about its impact on the ecosystem, particularly the mangroves and estuaries which are critical habitat for various plants and animals. The development area does not include the point on the northeast tip of the island which has a large inlet and estuary. It also has the largest mangrove concentration on the north side. Preserving this area is a wise sustainable decision. The other positive steps are the mangrove restoration and the turtle nest conservation. The scale of development makes sustainability a challenge. Some of the proposed industries, such as mining and petroleum, are not in keeping with the sustainable ideals laid out in the proposed development plan. Whether the developers follow the "Eco Island" concept remains to be seen.

2. New Ireland, Papua New Guinea

Papua New Guinea has just recently become popular with surf tourists. It is a group of islands with a large number of coastlines exposed to open ocean swells as well as wind swells. Their abundant reefs, swells, beautiful coastlines, and warm weather make them a prime surfing destination. As many have noted, the success of a surf tourism industry has a fundamental dilemma that makes it unviable in the long run. Many surf tourism destinations are operated from an unrestricted free market mentality that promotes competition not cooperation.[244] This often leads to overcrowding and, as a result, ends up discouraging surfers from returning to that

[242] Mark Dwyer, ed., *Bintan Eco Island Indonesia* (Madrid, Spain: Fundacion Metropoli, 2011), accessed November 1, 2013, http://lagoibaybintan.com/beyond-2015/, 161.
[243] Ibid., 177-179.
[244] Danny O'Brien and Jess Ponting, "Sustainable Surf Tourism: A Community Centered Approach in Papua New Guinea," *Journal of Sport Management* 27 (2013): 160, accessed November 1, 2013, http://journals.humankinetics.com/jsm-back-issues/jsm-volume-27-issue-2-march/sustainable-surf-tourism-a-community-centered-approach-in-papua-new-guinea.

destination.[245] Papua New Guinea may have developed a more sustainable model for surf tourism.

The Surfing Association of Papua New Guinea (SAPNG) has collaborated with both commercial interests, local surf clubs and the groups who traditionally have rights to the reef in order to implement a Surf Management Plan (SMP).[246] The "surfing resource" is managed so that all of the stakeholders benefit. In Papua New Guinea the coastal communities have custodial rights to the reefs.[247] The SMP implements a system where the surf tourist pays a fee for access to the reef and in turn the number of surfers are limited; this provides income for the local community and gives the surfer a better experience.[248] Limiting the number of surfers at one time can also help avoid conflicts because local people rely on the fish from the coastal zone for food. The income goes to the local surf club near that reef, which represents the local community, where it is used to fund projects to the benefit of the village.[249]

The drawbacks I see to this plan are issues related to control. Who are the decision makers? What is the fee funding? Who sets the quota for the number of surfers in a given area and how do they decide? What happens when a tour operator who is not part of the system brings in a boat full of surfers? How do they enforce the quota? All of these issues will have to be worked out among the stakeholders. As with anything involving money, there is always a risk for corruption. Hopefully the entire village has a vote on what the money is being used for.

I think the Surf Management Plan is a good system to protect an emerging surf destination. The surf tourist will have to be educated on the cultural concept that

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[245] Danny O'Brien and Jess Ponting, "Sustainable Surf Tourism: A Community Centered Approach in Papua New Guinea," *Journal of Sport Management* 27 (2013): 160, accessed November 1, 2013, http://journals.humankinetics.com/jsm-back-issues/jsm-volume-27-issue-2-march/sustainable-surf-tourism-a-community-centered-approach-in-papua-new-guinea.
[246] "Surf Management Plan," *Surfing Association of Papua New Guinea*, accessed September 23, 2013, http://www.sapng.com/surf-management-plan.
[247] Ibid.
[248] Ibid.
[249] "Is Papua New Guinea's Innovative Surf Management Plan the Way of the Future?" *The Inertia*, accessed February 24, 2016, http://www.theinertia.com/surf/is-papua-new-guineas-innovative-surf-management-plan-the-way-of-the-future/.

dictates a particular group has the rights and responsibility to protect a reef that has been part of their livelihood for generations. The attitude that no one can own the ocean does not apply when you are a guest on someone else's reef. Considering the survey analysis, I don't think this concept can work for my site on Bali. For years Bali has embraced a "free market" approach where anyone can surf anywhere without a fee. Changing that system does not seem feasible.

3. Other Tourism Development

Nusa Island Retreat is a resort catering to a tourist who wants to go surfing, diving or fishing in Papua New Guinea. It's located just off the western tip of New Ireland (see Figure 34). When evaluating it from a surf tourist point of view one thing stands out: the location is not ideal for the prime surfing areas. The resort is located facing a narrow channel between the island of Nusa and New Ireland. According to Surfline all of the popular surf breaks around there are a "short boat ride from Nusa Island Retreat."[250] This restricts when, where and how long people can surf as opposed to a break that is close enough to paddle to from your hotel. The remoteness of the location also makes getting medical care a problem. The resort's website says that the Kavieng Hospital is only a couple of minutes away by boat.[251]

Figure 34. "Nusa Island Retreat" Google Earth

Infrastructure is an issue on small islands. Nusa Island Retreat has some good systems in place. For sewage they use dry

[250] "Papua New Guinea," *Surfline*, accessed February 24, 2016, http://www.surfline.com/travel/index.cfm?id=7267#7268.
[251] "About," *Nusa Island Retreat*, accessed February 24, 2016, http://www.nusaislandretreat.com/#!about/c1op9.

composting toilets.[252] This is the best solution for an isolated location that does not have sewer lines and must save natural resources like water. They use ground water for non-potable needs[253] which could get contaminated by poorly built septic tanks. Drinking water is provided by filtering rain water.[254] Energy is from a diesel generator and "some" PV panels attached to batteries.[255] While the diesel generator is not ideal, PV panels are still an expensive investment for a small hotel. Tourists expect reliable power on demand at any time of the day or night so this is a necessary compromise.

Another popular resort geared specifically to surfers is Hotel Komune Bali. It is in front of an excellent surf break called Keramas. The waves are the main draw here and, to that end, they have set up an experience where people can surf at night with strong floodlights illuminating the ocean every night.[256] From a surfer's point of view I'm sure this sounds like a great and unique concept, however, from an environmental viewpoint it is a terrible idea. Artificial lights on the coastline affect the orientation, navigation and mating of animals.[257] Sea turtles, especially, are affected because the pregnant females look for a dark beach to lay their eggs; if they can't find one they will nest in an inferior area which threatens the hatchlings survival.[258] Turtle hatchlings are also harmed by artificial lights because they go towards the brightest lights inland where they often die, instead of towards the

[252] "Facilities," *Nusa Island Retreat*, accessed February 24, 2016, http://www.nusaislandretreat.com/#!facilities/c9w3.
[253] Ibid.
[254] Ibid.
[255] Ibid.
[256] "Night Surf," *Hotel Komune Bali*, accessed February 25, 2016, http://www.komuneresorts.com/keramasbali/night-surf.
[257] "Artificial Lighting," *Sea Grant California*, accessed February 25, 2016, https://caseagrant.ucsd.edu/project/explore-sandy-beach-ecosystems-of-southern-california/artificial-lighting.
[258] "Information About Sea Turtles: Threats from Artificial Lighting," Sea Turtle Conservancy, accessed February 25, 2016, http://www.conserveturtles.org/seaturtleinformation.php?page=lighting.

ocean as they are meant to.[259] Since the hotel is promoting itself for the "environmentally conscious travelers"[260] this is a huge oversight.

Despite the nightly artificial lighting on the ocean, Hotel Komune Bali does have some good sustainable practices and policies. They produce some of their power from solar panels and use mostly LED or compact fluorescent lighting.[261] Wastewater is treated on site using the "best bio systems possible"[262] however, they do not elaborate on what that entails. After the water comes out of that system it is transferred to water gardens where it is further cleaned by the plants.[263] The hotel has organic gardens that supply food for their facilities which helps to minimize the associated carbon footprint from bringing food in from outside.[264] Many of the explanations for their "green" initiatives are vague and leave room for interpretation so it is hard to determine their effectiveness.

A major component of sustainable development is materials. Some resorts may say they build with all local and natural materials but they could be using tropical hardwoods that contribute to deforestation. One way to remedy this is to reuse or repurpose materials. Bambu Indah has made this the core idea of their hotel. They disassembled old Javanese teak wood houses, shipped them to Bali, and reassembled them.[265] The carbon footprint from shipping them between islands is not totally negligible but cutting down new teak trees carries the uncertainty about the teak farm's sustainable practices on top of the shipping impact. The few structures that were built new are made from bamboo which is a sustainable building

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[259] "Information About Sea Turtles: Threats from Artificial Lighting," Sea Turtle Conservancy, accessed February 25, 2016, http://www.conserveturtles.org/seaturtleinformation.php?page=lighting.
[260] "About Us," *Komune Resorts*, accessed February 25, 2016, http://www.komuneresorts.com/komune-resorts/about-komune.
[261] "Green," *Hotel Komune Bali*, accessed February 25, 2016, http://www.komuneresorts.com/keramasbali/green.
[262] Ibid.
[263] Ibid.
[264] Ibid.
[265] "Our Houses," *Bambu Indah*, accessed February 25, 2016, http://bambuindah.com/houses/.

material. They are designed to maximize natural light and passive cooling through open spaces, pitched ceilings and being raised on stilts.[266]

Bambu Indah has implemented many sustainable features. They do not supply drinking water in plastic water bottles, which is standard practice on Bali, instead they have a triple filter system so that the tap water is potable.[267] Wastewater from showers drains into the ground in order to replenish groundwater.[268] There is a pool but they don't indicate where the water is sourced; since there is a river nearby and they encourage "river baths" it is reasonable to assume it is coming from there. Bambu Indah does not use any chemicals in the pool, opting for vegetation to naturally clean the water.[269] They also recognize the impact of "light pollution" on animals so they use a small amount of lighting at night, giving guests flashlights for safety when walking on the grounds at night.[270]

4. Conclusions

The case studies have provided some good ideas for designing a sustainable surf resort. The scale of development must be considered because of the impact on the local ecosystem, the amount of natural resources consumed and the cultural impact. Implementing a surf management plan in a "new" surfing destination can prevent some of the pitfalls that have been experienced in mature surfing markets and possibly prevent the decline in surf tourists in the long run. Design and operational decisions have a large impact on the true sustainability of a project. Every aspect needs to be evaluated from different perspectives. The hotel must find the right balance between meeting the guest's expectations and staying true to their green values.

[266] "Responsible Living," *Bambu Indah*, accessed February 25, 2016, http://bambuindah.com/about/csr/.
[267] Ibid.
[268] Ibid.
[269] Ibid.
[270] Ibid.

Chapter 4. Design

E. Background

Tourism development includes many built structures which have a large impact on the area. I feel the most significant contributor is accommodations, therefore, I decided to design a small hotel complex for surf tourists. The materials used for construction, natural resources consumed, site alterations, and operational decisions can all be tailored in order to lessen this impact.

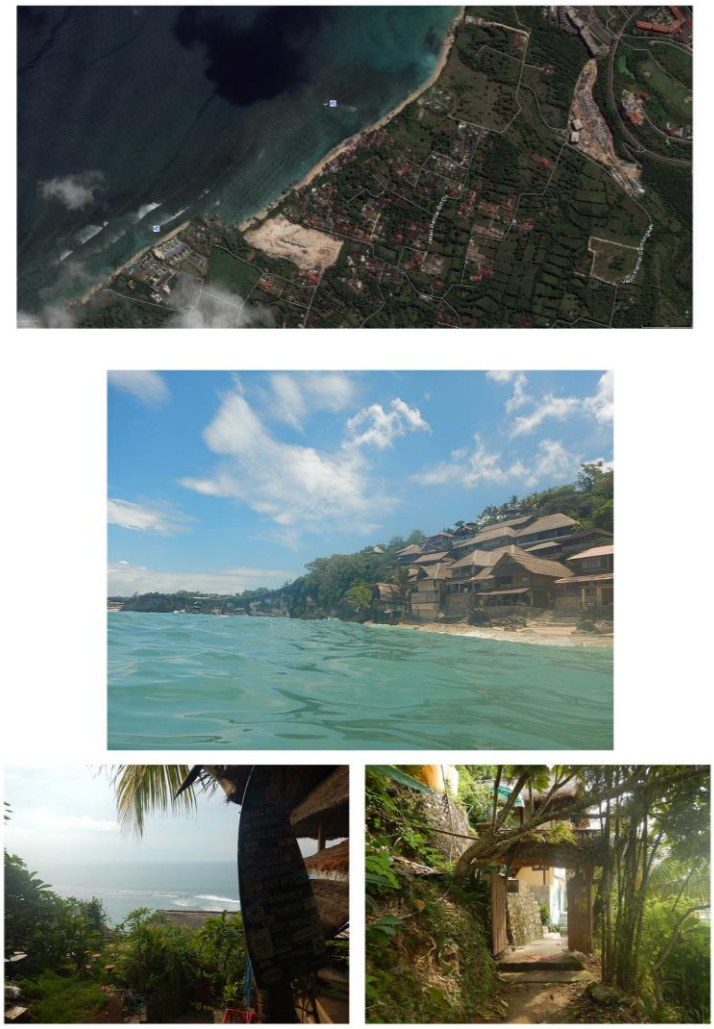


Figure 35. Top: "Bingin Beach" Google Earth, Middle: Bingin Beach Development - Photo by Author, Bottom: Bingin Hillside - Photos by Author

When choosing a site for my design I decided to focus on areas near multiple surf breaks which are accessible by roads and already have some infrastructure. I did not want to propose building in an undeveloped area which would require infrastructure and encourage tourism sprawl. I also did not choose the Kuta area because it is already saturated with accommodations and has a decidedly different feel than my vision. This led to the Bukit Peninsula in southern Bali. It is close to the airport, has roads and already has development along the coast.

When I traveled around the Bukit Peninsula one area stood out to me: Bingin beach (see Figure 35 Top). It is known among surfers for having great waves that are near perfection during the dry season. The beach in front of the surf break is rather narrow and can disappear altogether at high tide. There are many rocks along the shore and strong currents making it a less than ideal swimming beach. The shoreline is sloping towards the ocean with steep cliffs to the north and south. Despite all of these factors, there is development up to the edge of the beach (see Figure 35 Middle). This is not a desirable site for typical tourism development; therefore, I think that one of the catalysts for development here is surf tourism.

Bingin is an interesting mix of small businesses interspersed with residences. There are hotels, restaurants, small stores and surfboard repair services (see Figure 35 Bottom). Access to the shoreline is through a series of paths and stairs winding down the hill which cross through various thresholds weaving in and out of buildings (see Figure 35 Bottom). Although it is rather steep and maze like, many tourists that I spoke to said they liked that aspect of coming to Bingin. Another interesting characteristic of this area is how they have adapted the infrastructure to this site. Power lines and water pipes run above ground next to the path often attaching to trees (see Figure 36). This solution is problematic and dangerous. I could not find out what happens to the sewage at Bingin.

I spoke to a couple who built one of the first residences at Bingin in order to get insight into the development of the area. They told me that to build there they needed to go to the local *banjar* (village chief) in order to get permission, which is customary in Bali. They said that the land is government owned technically and even though Indonesia has instituted a formal building permit system, in reality it is not followed for these small scale buildings. I observed some well-constructed buildings and some that were questionable.

Figure 36. Power Lines & Water Pipes Next to Walkway to Bingin Beach - Photo by Author

I chose a vacant ocean front lot in the Bingin area as the site for my design (see Figure 37). The development at Bingin is a quirky unplanned amalgam of buildings. There is an opportunity to keep the feeling of this community, which is appealing to visitors, while addressing the infrastructure and safety issues. This site is bordered by other hotels to the north, east and south. A band of commercial and residential development is to the southwest along the coast. Several world class surf breaks are within a 3 mile radius from this site.

Figure 37. "Bingin Beach" Google Earth (modified)

F. Design Basis

Tourism is based on the idea of getting away from familiar surroundings and experiences. I think that a surfer who travels to a tropical or subtropical region is anticipating a "paradise" like the numerous images imprinted in their subconscious. The idea of warm water where they don't need a wetsuit to surf, sunny days and swaying palm trees is quite appealing. Being in a tropical climate allows the surf tourist to experience a lifestyle that is not usually possible where they live.

Since I am designing for surf tourists in particular, the ocean was my starting point. I was inspired by the wave form itself and how waves organize into sets as they approach the shore (see Figure 38). The buildings are oriented in bands that

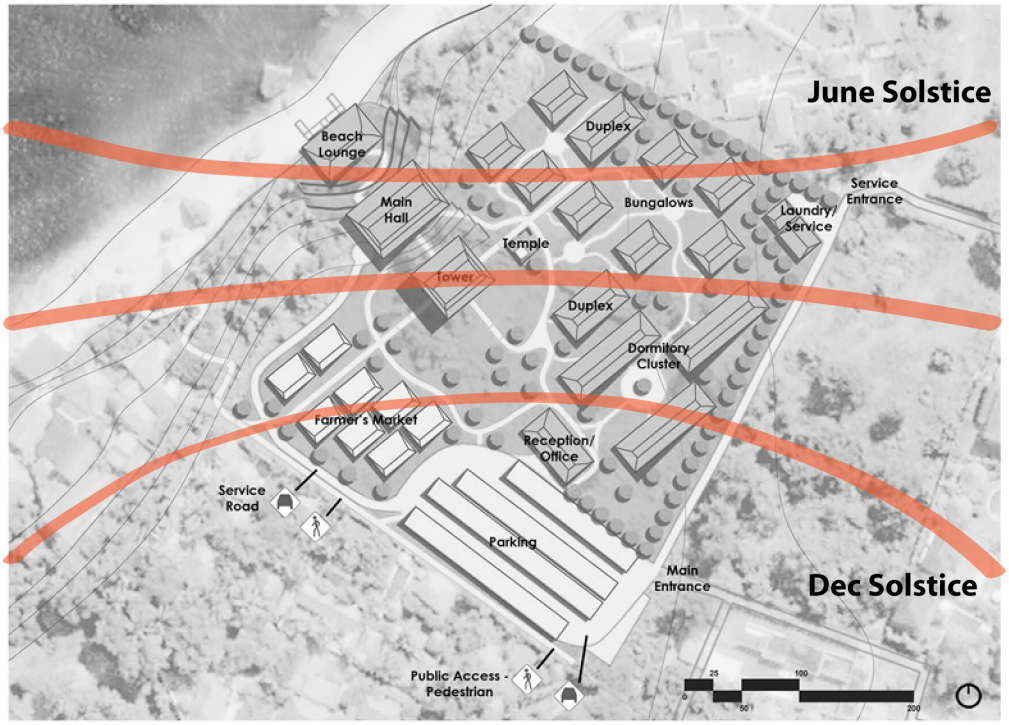
Figure 38. Parti Diagram

are parallel to the shoreline. The main roof structures are reminiscent of an approaching wave that is ready to break. The central focus of the complex is a viewing tower which allows the guests to check the waves at several nearby surf breaks (see Figure 39). A perpendicular axis from the tower to the ocean is the main circulation path to the beach which places the guests in an ideal area to paddle out to the surf break Bingin.

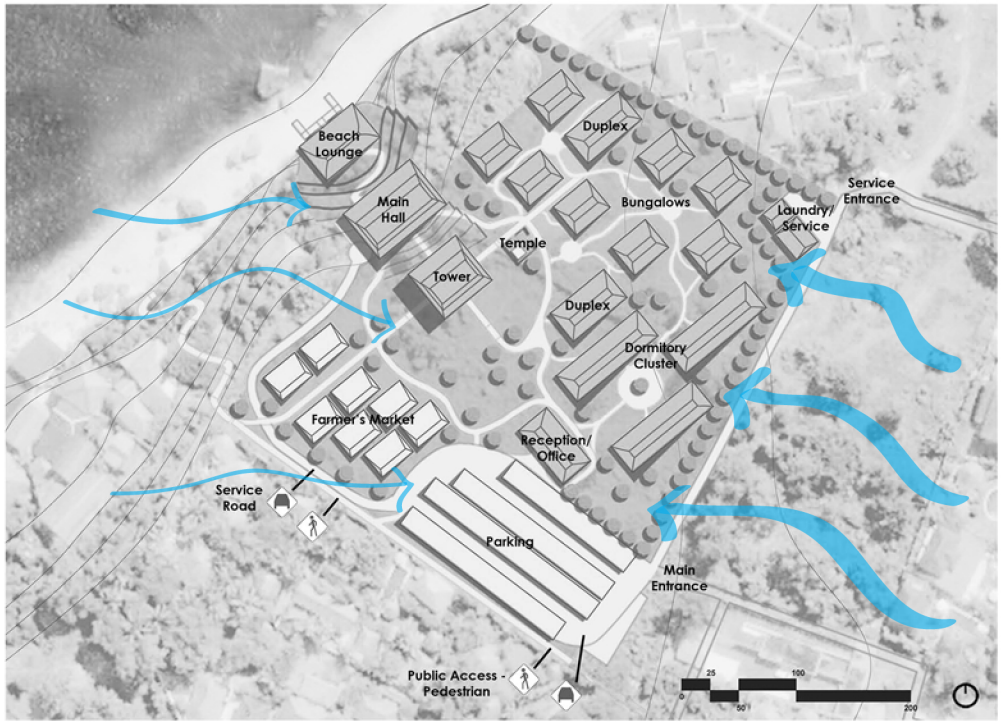
Buildings are oriented in response to the climate at the site (see Figure 40). Since Bali is close to the equator the sun path does not vary much throughout the year, therefore, emphasis is on overhead shading. The wind blows from the West during the monsoon season and the East Southeast during the dry season. The buildings are arranged to capture the wind during both seasons. A staggered pattern allows wind to flow around the guest rooms ensuring that all buildings receive wind.

The layout facilitates excellent views from the site (see Figure 41). Most guest rooms have an ocean view from their lanais. The main gathering spaces also have direct views of the ocean, specifically the surf break Bingin directly offshore.

Figure 39. Site Plan



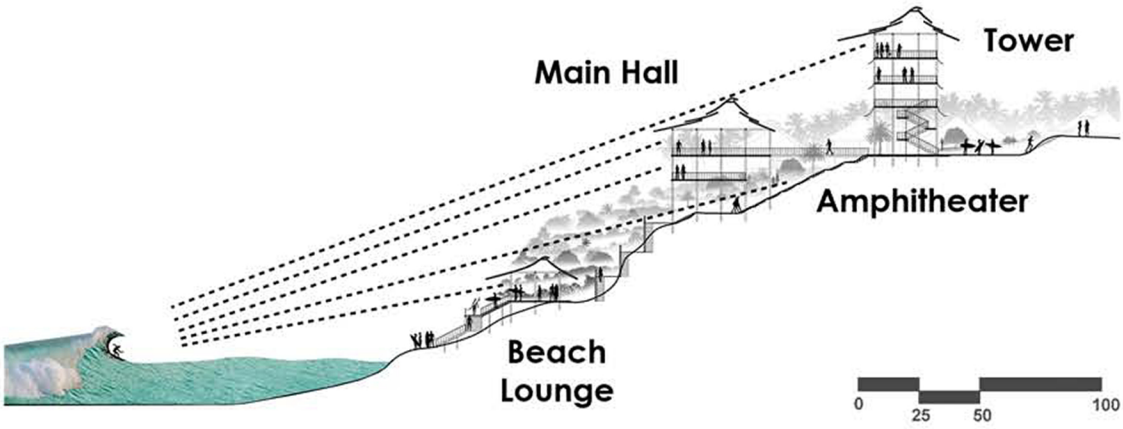
Sunpath

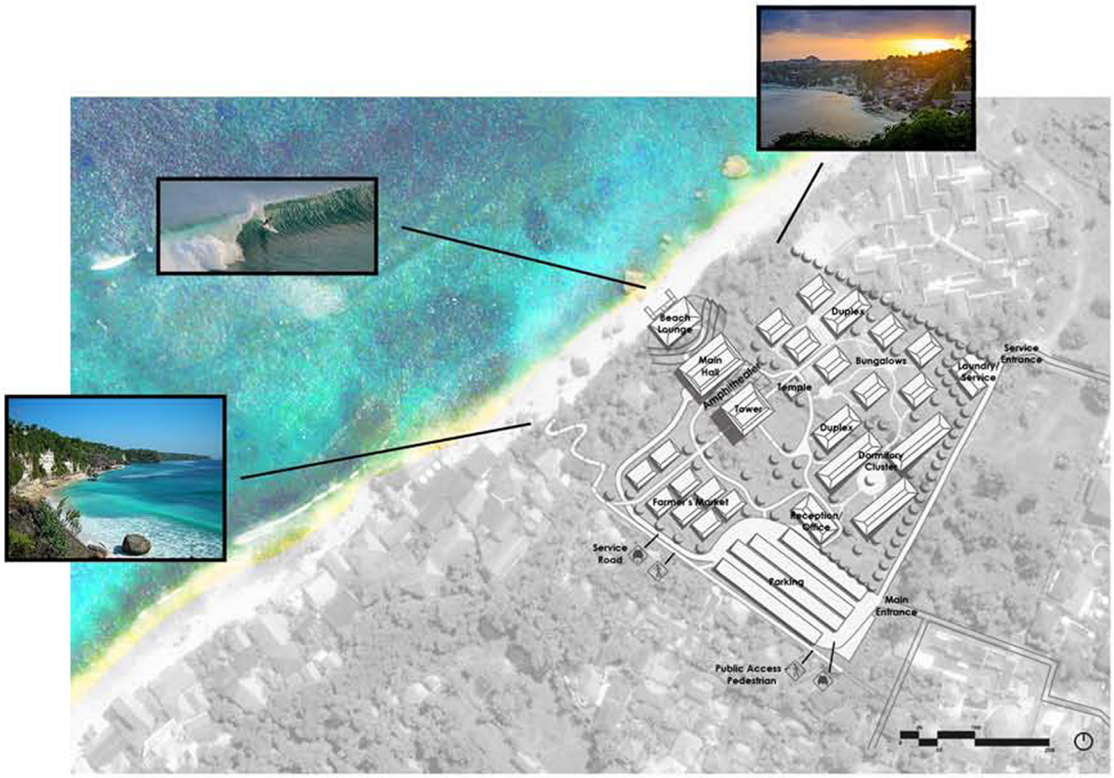


Wind

Wet Season (Oct-Apr) - West
Dry Season (May-Sep) - East Southeast

Figure 40





Views

Figure 41

Surfers are literally immersed in nature. Repeated contact makes the surfer more aware of the natural rhythms of nature since predicting the best waves depends just as much on swells, tides, winds, and currents, as it does on the bathymetry of the sea floor. This relationship with nature is an important concept in my design. I wanted the hotel guest to have contact with nature through all of their senses; as a result, much of the design focuses on outdoor living. The guest will be in tune with the cycles of nature like the annual change of season between monsoon and dry. There are no totally sealed off spaces in my design. The large public buildings have no exterior walls allowing the guest to truly experience Bali's environment. The individual sleeping bungalows have large covered lanais with modestly sized enclosed bedrooms to encourage outdoor living. Care has been taken to preserve as much of the dense vegetation along the ocean side as possible without compromising safety.

Sustainability was also a large factor in my design. There are many aspects to sustainability that informed my design decisions. I chose materials that can be found and fabricated locally. I also chose materials based on reducing the waste and harmful chemicals that are often used during processing and treatment to prevent degradation. The main systems are designed with the intent of reducing consumption, using what's on the site and recycling.

Many people visit Bali to experience its unique culture. The predominant Hindu religion requires daily rituals to be carried out by community members. In order to respect this I have included a temple in the northeast side of the main complex which is the direction facing the sacred Mount Agung. I also thought about the Balinese hierarchy of space, explained earlier, Tri Angga: Nista – Madya – Utama. This conceptually divides the world into three sections that are for evil spirits, humans and the gods.[271] I arranged the buildings with this in mind (see Figure 41). Nista, the lowest point next to the ocean, is occupied by a relaxation area but not sleeping quarters. Madya, the ground level, contains buildings for human activities. Lastly, Utama, the highest point, is represented by the viewing tower. The

[271] Eko Budihardjo, *Architectural Conservation in Bali* (Yogyakarta, Indonesia: Gadjah Mada University Press, 1986), 39.

forms, materials and aesthetics are also in harmony with Bali which, I feel, is part of respecting the culture and people. A Modern glass box would not be appropriate here.

Since my surveys revealed that many surfers who travel to Bali tend to stay for more than two weeks I wanted to create a sense of community at the hotel complex. This is achieved by providing a dormitory lodging option and a shared kitchen for use by all guests in the Main Hall. Socializing is encouraged by having an outdoor gathering area for each guest room cluster and large lounge areas throughout the site. The Viewing Tower is a place for guests to check the surf and socialize. I have also incorporated a large outdoor amphitheater into my design as an area to gather for activities such as informal concerts, dance performances, movies and cultural activities. This venue can also bring in people from the surrounding areas, drawing both locals and tourists. Another way to bring together locals and hotel guests is with a farmer's market. It will benefit locals by providing income and guests will be able to cook and share meals using fresh local ingredients.

G. Materials

The construction materials are found locally on the island of Bali. Bali had a long tradition of building with bamboo so the local people are already highly skilled

Figure 42. "PT Bambu Pure to Bingin Beach" Google Earth

at bamboo construction, therefore, bamboo will be used throughout the project. Most of the structural members and furniture can be made from the bamboo species Dendrocalamus Asper, which grows throughout Indonesia and is suitable for structural application.[272] Bamboo is already being farmed and processed less than 30 miles from my site by PT Bambu Pure (see Figure 42). While bamboo has been seen by some as an inferior building material it has had a surge in popularity now that people understand that with the right species selection, drying and treatment the poles can last 50 years or longer.[273]

As many people have noted bamboo is an excellent material when trying to build as sustainably as possible while maintaining structural integrity. A presentation from the Food and Agriculture Organization of the United Nations notes that "bamboo absorbs 35% more carbon dioxide compared to trees. It also emits 35% more oxygen."[274] Bamboo is ready to be harvested at 3-6 years[275] and cutting a cane does not kill the plant like trees used for construction. Bamboo structures have also proven to be safe, or even superior, to some building materials in earthquake prone areas like Columbia.[276] This makes it a good choice for my design since Bali is susceptible to earthquakes.[277]

I was able to visit PT Bamboo Pure in order to learn about the process of making bamboo ready for construction. Poles are submerged in a heated boron solution in order to force the salt crystals into the bamboo cells. This salt has a very low toxicity and guards the poles against insects. Another treatment option is a

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[272] Darrel DeBoer, and Megan Groth, *Bamboo Building Essentials: Eleven Basic Principles* (DeBoer Architects, 2010), 16.
[273] "Durability of Bamboo," *Guadua Bamboo*, accessed February 21, 2016, http://www.guaduabamboo.com/preservation/durability-of-bamboo.
[274] "Help Save the World with Bamboo," *Food and Agriculture Organization of the United Nations*, accessed February 21, 2016, https://webcache.googleusercontent.com/search?q=cache:6NjoGr7hx70J:https://www.researchgate.net/file.PostFileLoader.html%3Fid%3D4f459a7d80e582a315000000%26assetKey%3DAS%253A271742713434115%2540441799919189+&cd=4&hl=en&ct=clnk&gl=us.
[275] DeBoer and Groth, *Bamboo Building Essentials*, 22.
[276] Ibid., 69.
[277] Mark Petersen et al., "Documentation for the Southeast Asia Seismic Hazard Maps," *U.S. Department of the Interior, U.S. Geological Survey*, Administrative Report September 30, 2007, p. 24, Accessed September 6, 2015, http://earthquake.usgs.gov/hazards/products/images/SEASIA_2007.pdf.

product called Freemite that is made on Bali from salts and plant extracts which is non-toxic.[278] This product has been tested using the Japan Industrial Standard and proven effective on bamboo to guard against termites, powder post beetles and woodworm.[279]

Bamboo needs to be protected from sun and rain in order to maintain its integrity so my design uses large roofs with deep eaves. It is common in Bali to use bamboo for the roofs as well. I'm using clay tiles instead because rainwater is being collected from the roofs and tile is more durable (see Figure 43). Clay tile also has less chance of contributing to health hazards.[280] The sleeping bungalows have plaster walls covering a bamboo substrate with all structural members made from bamboo. This is a low technology and inexpensive system that is durable having been used on Java in the early 1900s.[281] This gives privacy to hotel guests as well as keeping insects and wildlife out.

Buildings are raised off the ground with a hybrid bamboo and concrete system (see Figure 43). The cut end on bamboo readily absorbs moisture so it is necessary to prevent contact with the ground. Monsoon season also poses a hazard. A concrete micro pile is reinforced with rebar. There is a metal plate between the cut end of the bamboo and the concrete to prevent moisture transfer. The lower section of the bamboo column is then filled with concrete.

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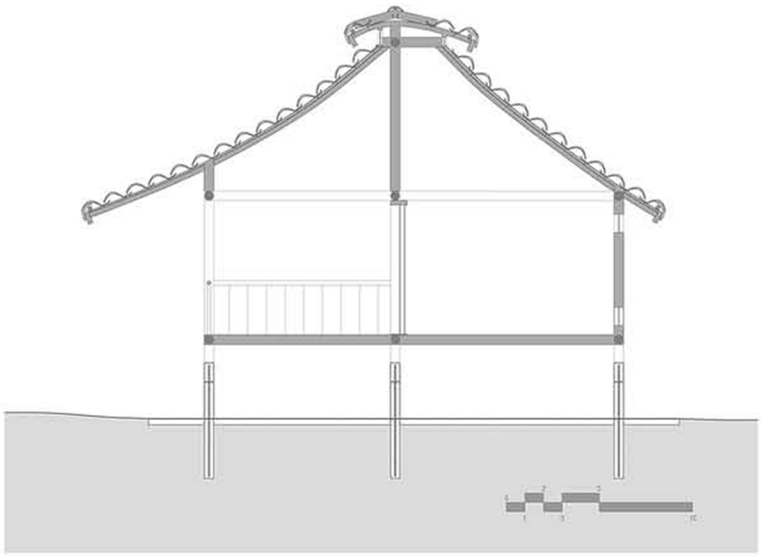
[278] "Getting Rid of Termites," *Freemite*, accessed February 21, 2016, http://www.freemite.com/getting-rid-of-termites_5.html.
[279] "Bamboo Technical Knowhow," *Asali Bali*, accessed February 21, 2016, http://www.bamboobali.asia/bamboo-technical-knowhow/.
[280] "An Introduction to Rainwater Harvesting," *The Global Development Research Center*, accessed February 24, 2016, http://www.gdrc.org/uem/water/rainwater/introduction.html.
[281] Gunawan Tanuwidjaja et al., "Eco+Bamboo House (Eco-Plastered-Bamboo House) for Sustainable and Affordable Homes in Indonesia," S*cribd*, accessed February 21, 2016. http://www.scribd.com/doc/33700151/20100629-SS-Eco-Settlement-Seminar-Eco-Plastered-Bamboo-Hou.

Materials



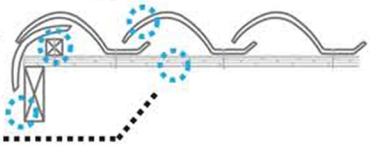
Roof

Clay "S" Tile

Fasteners

Vertical Fascia

Roof Deck



Structure

Dendrocalamus Asper (Giar Bamboo) for all Structural Members

Various Bamboo Species for Furniture and Fixtures

Footings

Bamboo Pole

Concrete Fill in End of Bamboo Pole

Metal Plate Separating Cut Bamboo End from Concrete

Bamboo Raised Off Ground to Prevent Moisture Absorption

Concrete Micropile

Rebar

Figure 43

H. Systems

As mentioned earlier, Bali is predicted to have a freshwater shortage in the near future largely due to tourism development. Reducing consumption is the first step in addressing this problem. My design does not have any water features that use potable water nor a swimming pool. There is a beach club (El Kabron) less than a half mile north of my site with a swimming pool if desired. Low flow fixtures are to be used throughout the property.

One of the biggest wastes of potable water is flushing toilets. Instead of having to deal with 50 liters of feces per person per year which is potentially dangerous, a water flushing toilet makes it necessary to treat 550 liters of polluted materials since it mixes urine and feces together requiring up to 15,000 liters of potable water per person per year.[282] An alternative is a toilet that separates urine and feces and then composts the feces so that it can be used as fertilizer. There are numerous toilets on the market that accomplish this. As noted by Gunter Pauli, if these wastes are collected separately there is little to no bad smells.[283] Sweden has been using urine diverting toilets since the end of the 19th century; the urine is even used to fertilize farmland.[284]

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[282] Uno Winblad, *Towards an Ecological Approach to Sanitation*, (Stockholm: SIDA, 1997), 4, accessed February 23, 2016, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwiNzeWhzZHLAhVH7GMKHZKfCjIQFggfMAA&url=http%3A%2F%2Fwww.sida.se%2Fglobalassets%2Fpublications%2Fimport%2Fpdf%2Fen%2Ftowards-an-ecological-approach-to-sanitation_1269.pdf&usg=AFQjCNFgn3TmgbM5Scj5ZpkLK3Es6SYbVg&bvm=bv.115277099,d.cGc.

[283] Gunter Pauli, *The Blue Economy: 10 Years, 100 Innovations, 100 Million Jobs* (Taos, New Mexico: Paradigm Publications, 2010), 206.

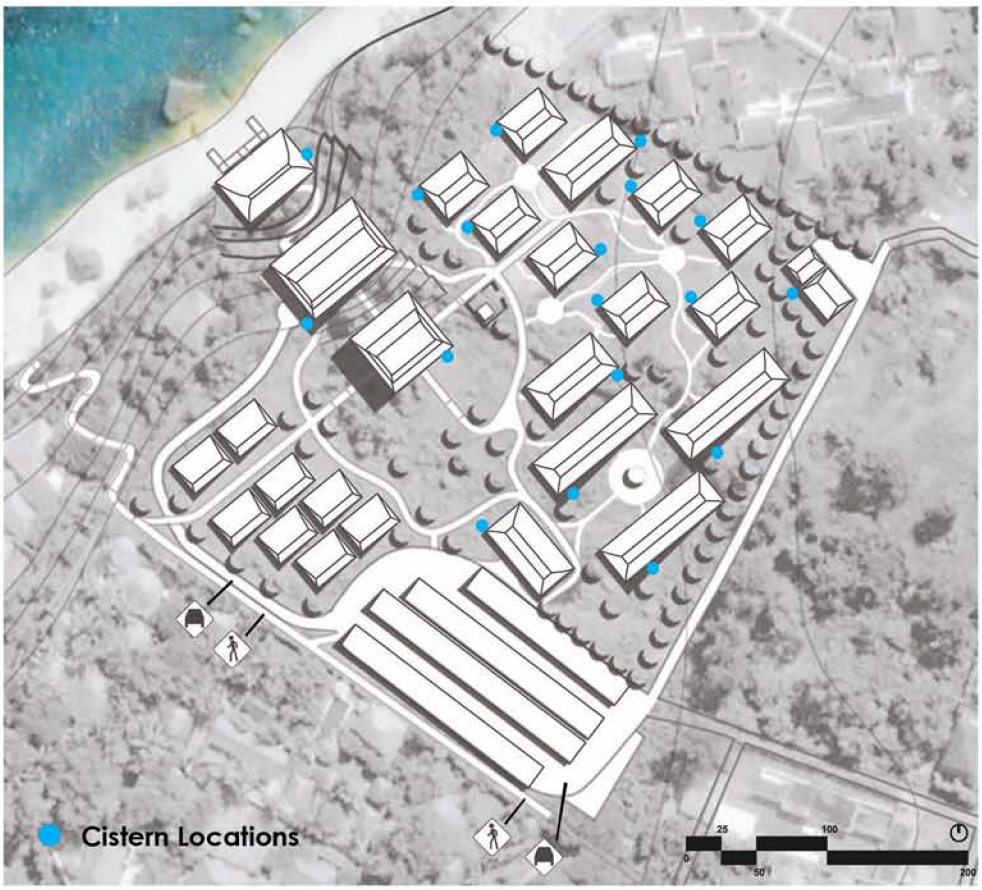
[284] Elisabeth Kvarnström et al., *Urine Diversion: One Step Towards Sustainable Sanitation* (Stockholm: EcoSanRes Publications, 2006), 20.

The second way to conserve precious freshwater is to collect rainwater. The Bukit Peninsula is drier than the north of Bali, however, it does receive a fair amount of rain during monsoon season. Since there's no water necessary for the toilets, the guests' water needs can be partially covered by rainwater and in wetter months it should be able to provide 100% of demand (see Table 10). Due to the large roof

Table 10. Rainwater Collection Calculated

			Tower	Restaurant/ Lounge	Beach Lounge	Single Bungalows	Duplex Bungalows	Dormitories
		Roof Square Footage (Catchment Area):	2025	3750	2268	1000	1625	2500
		Gallons of Water per Inch of Rain:	0.625	0.625	0.625	0.625	0.625	0.625
		Water Collected per Roof per Inch of Rain (gallons):	1265.63	2343.75	1417.50	625.00	1015.63	1562.50
Month	Mo Total (mm)	Mo Total (in)	Monthly Water Collected (gallons)	Monthly Water Collected (gallons)	Monthly Water Collected (gallons)	Monthly Water Collected (gallons)	Monthly Water Collected (gallons)	Monthly Water Collected (gallons)
Dec	130.7	5.15	**6512.49**	**12060.17**	**7293.99**	**3216.05**	**5226.07**	**8040.11**
Jan	190.8	7.51	**9507.14**	**17605.82**	**10648.00**	**4694.88**	**7629.19**	**11737.21**
Feb	136	5.35	**6776.58**	**12549.22**	**7589.77**	**3346.46**	**5438.00**	**8366.15**
Mar	101.6	4.00	**5062.50**	**9375.01**	**5670.00**	**2500.00**	**4062.50**	**6250.00**
Apr	65.9	2.59	3283.65	6080.83	3677.69	1621.56	2635.03	4053.89
May	21.5	0.85	1071.30	1983.88	1199.85	529.04	859.68	1322.59
Jun	15	0.59	747.42	1384.11	837.11	369.09	599.78	922.74
Jul	12.6	0.50	627.83	1162.65	703.17	310.04	503.81	775.10
Aug	1.3	0.05	64.78	119.96	72.55	31.99	51.98	79.97
Sep	10.1	0.40	503.26	931.96	563.65	248.52	403.85	621.31
Oct	30.9	1.22	1539.68	2851.26	1724.44	760.34	1235.54	1900.84
Nov	52.6	2.07	2620.94	4853.60	2935.45	1294.29	2103.22	3235.73
Annual	**769**	**30.28**	**38317.56**	**70958.45**	**42915.67**	**18922.25**	**30748.66**	**47305.64**
		Dec-Mar Monthly Average (gallons):	**6964.68**	**12897.55**	**7800.44**	**3439.35**	**5588.94**	**8598.37**
		Monthly Average (gallons):	**3193.13**	**5913.20**	**3576.31**	**1576.85**	**2562.39**	**3942.14**

structures there is an opportunity to collect rain for uses like showers, sinks and watering the vegetation (see Figure 44). There are cisterns located next to every building that is collecting rainwater. A pump cycles the water through a filtration and purification system which then feeds into the showers and sinks. The graywater from sinks and showers will also be used for irrigating the grounds.



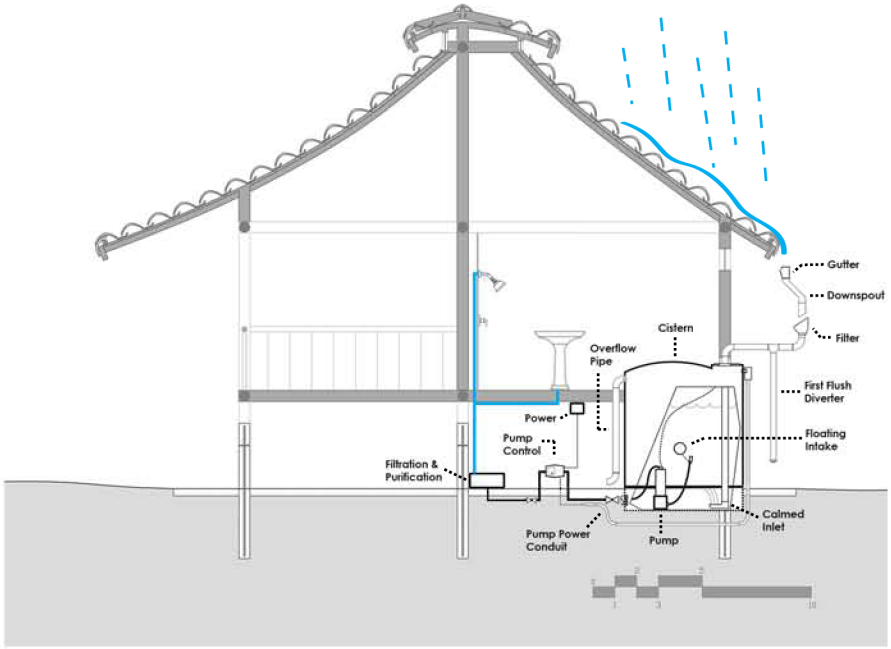


Figure 44. Rainwater Collection

Measures to reduce energy consumption are incorporated into the design. There are no air conditioned spaces on the site. When I talked to the surf tourists while I was giving them surveys to fill out in Bali, most of the people were on vacation trying to get away from the winter and did not mind the high temperatures. Natural ventilation and shading are utilized to provide a comfortable space (see Figure 45). The layout and orientation of the buildings are designed to capture the west winds during the wet season and the east southeast winds during the dry season. Roofs are large in order to reduce solar heat gain. There is also a large air space and vents above the human occupation zones to allow the hot air to rise and vent out of the buildings. Fans can be turned on when the rooms are occupied. Structures are raised off the ground to allow air to circulate around the building.

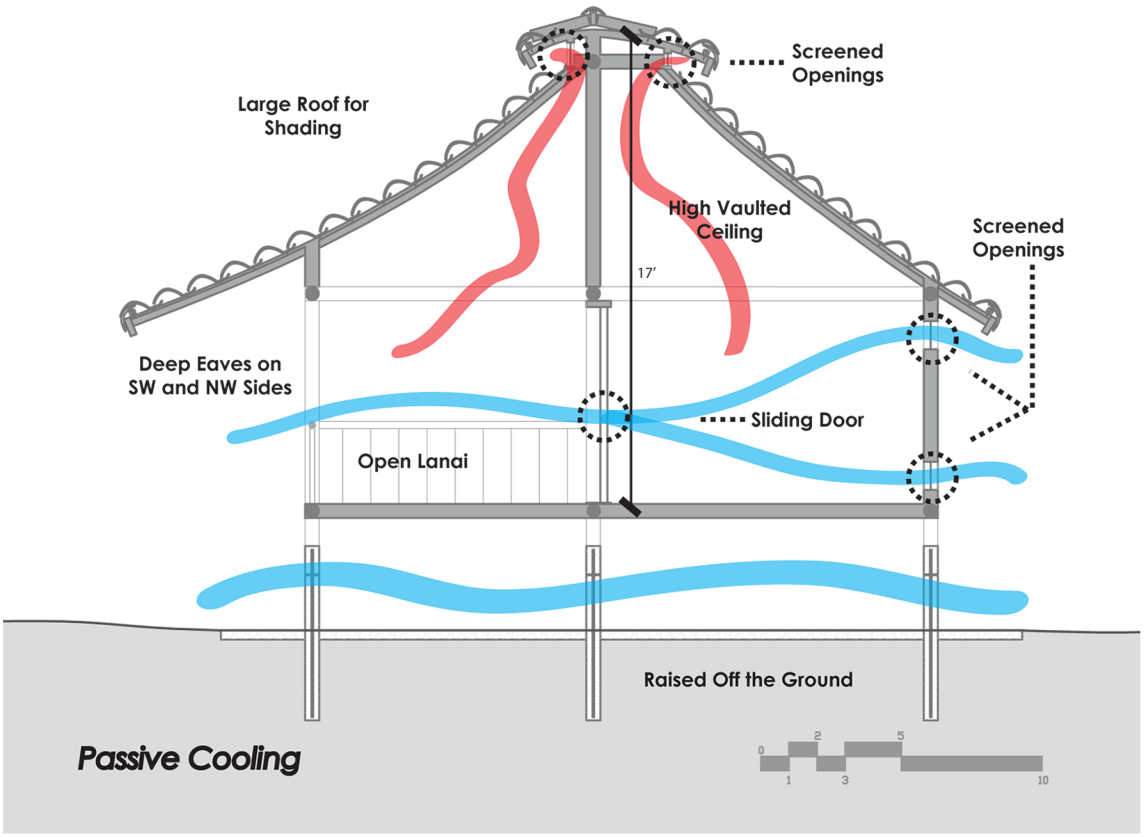

Large Roof for Shading
Screened Openings
High Vaulted Ceiling
17'
Screened Openings
Deep Eaves on SW and NW Sides
Sliding Door
Open Lanai
Raised Off the Ground
Passive Cooling
0
2
5
1
3
10

Figure 45

Energy is also conserved by not having traditional hot water heaters for showers. The air temperature is high and, therefore, hot water is not usually desirable. If a guest does want warm water, a simple solar batch water heater that does not require power, is attached to the guest rooms.

Sunshine is abundant in Bali. Taking advantage of this natural resource is a good idea in an area with a questionable power supply. There are photovoltaic panels on the top of the Farmer's Market and Parking since there is less vegetation there, providing full sun (see Figure 46). Admittedly photovoltaic panels are still prohibitively expensive in developing countries. The hotel budget would ultimately have to determine if this is feasible.

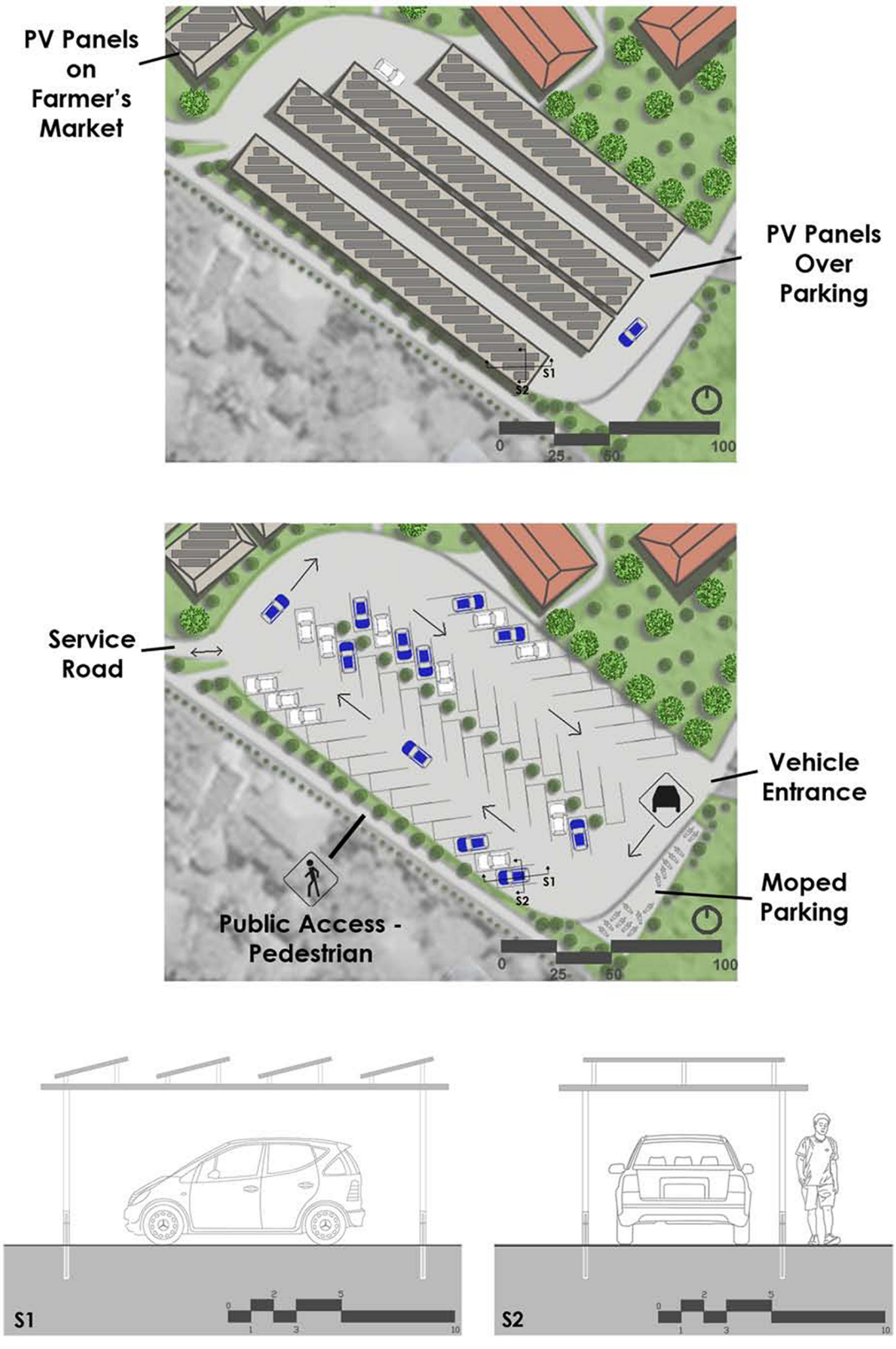


Figure 46. PV Panels

I. Operations

Some operational decisions are important in the overall concept of this design. There is an effort to reduce the amount of trash generated. The kitchens and restaurants do not have any disposable dishware or utensils. Glass and aluminum trash are recycled. Biodegradable soaps and shampoos are used and provided to guests so that graywater can be used for irrigation.

Many people on Bali do not do their own laundry. Laundry services are cheap and widely available, however, they use some very wasteful practices. Typically, every piece of clothing is put into a separate plastic bag. For this project, laundry is done on site so that sustainable practices, such as transporting articles in fabric bags, are followed.

J. Implications from Survey

The survey of surf tourists impacted the design and concepts for this design. The following is a summary of the survey results and implications:

1. Small groups -> individual or double rooms, duplex, dormitory option
2. Long trips -> common cooking facilities to save money and make hotel a base for travel to nearby areas, surfboard storage
3. Factors when choosing surf destination

   Very Important:

   - Wave quality-> sited close to good surf break

   Somewhat Important:

   - Health (clean water, low pollution)-> collect and treat rainwater on site, provide UV purification for drinking water, composting toilets, minimize trash, do not use plastic bags, provide reusable tableware, recycle glass and aluminum, laundry services that don't use toxic chemicals and excessive packaging
4. Factors when choosing accommodations

   Very Important/ Somewhat Important:

- Price-> keep costs down (not high technology systems, inexpensive materials, shared kitchen, farmer's market, dormitory)
- Proximity to surf breaks-> sited in close proximity to many of the top high season surf breaks

Somewhat Important:

- Safety (personal & property)-> sited in safe area, controlled access, secure surfboard storage
- Amenities (parking, pool, wifi, restaurant, etc.)-> provide parking, wifi, restaurant, food/ produce vendor visit three times a week (farmer's market), laundry services
- Aesthetics(architecture, decor, grounds)-> attractive, lush grounds

K. Program

Site area: approx. 1.9 hectares = 4.8 acres = 207,495 ft^2

The site is divided into four zones:

- Back of House – kitchen, laundry, office & storage, loading zone
- Public – parking, coastal access, farmer's market, temple
- Semi-Private – tower, shared kitchen & dining, restaurant, lounge, equipment storage & maintenance, coastal access, outdoor leisure
- Private – guest rooms

The circulation reflects this hierarchy. The service road is accessed on the north side of the property connecting the main public road to the loading zone and laundry (see Figure 47). Service vehicles can access the office from the parking lot. They can also drive to the Farmer's Market and kitchen for loading and unloading.

The public can park on site in order to access the coast. There is a pedestrian path that runs from the south edge of the site to the beach (see Figure 49). This also serves to connect the surrounding communities and tourists to activities at the hotel such as the Farmer's Market.

Figure 47. Circulation - Service

The circulation for the gathering spaces for hotel guests run in two main axes which form a cross roads at the Viewing Tower (see Figure 48). One connects the public beach access with the guest rooms. The other connects the Reception and Parking to the Beach Lounge. From there the hotel guests can paddle directly out to the surf break.

Guest rooms are grouped in clusters around courtyards on the Northeast side of the property (see Figure 50). The private paths to the rooms are accessed from these interconnected gathering spaces.

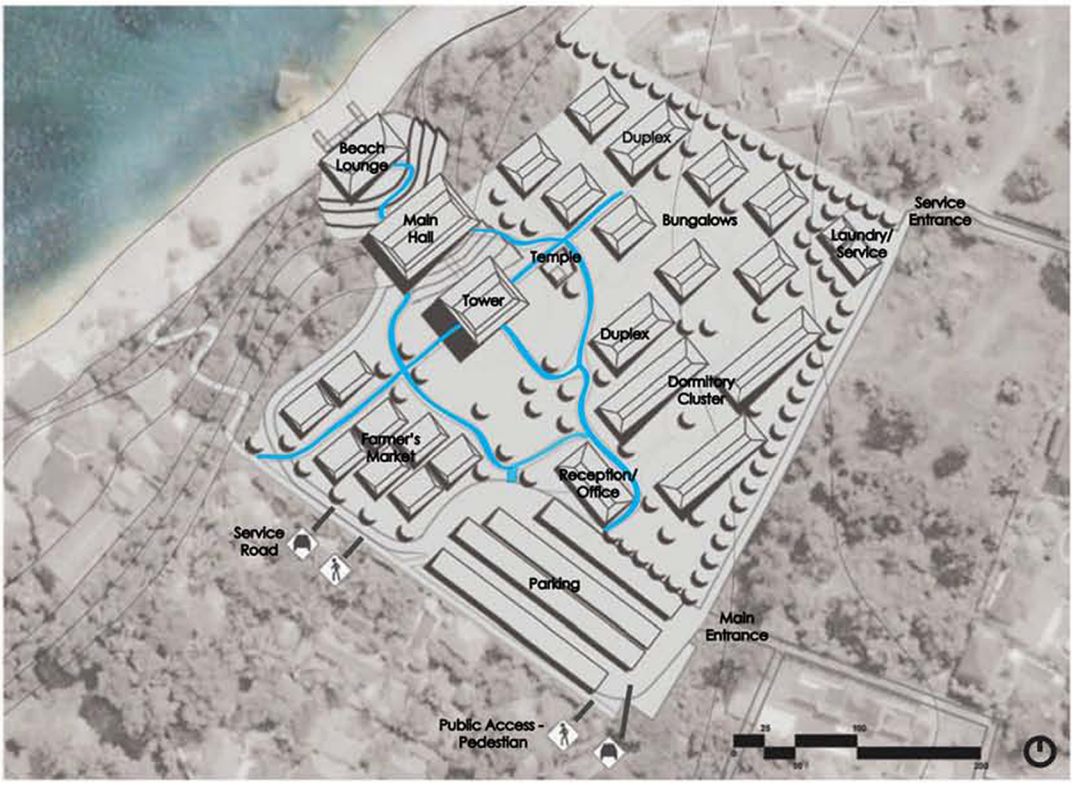


Figure 48. Circulation - Internal

Figure 49. Circulation - Pedestrian

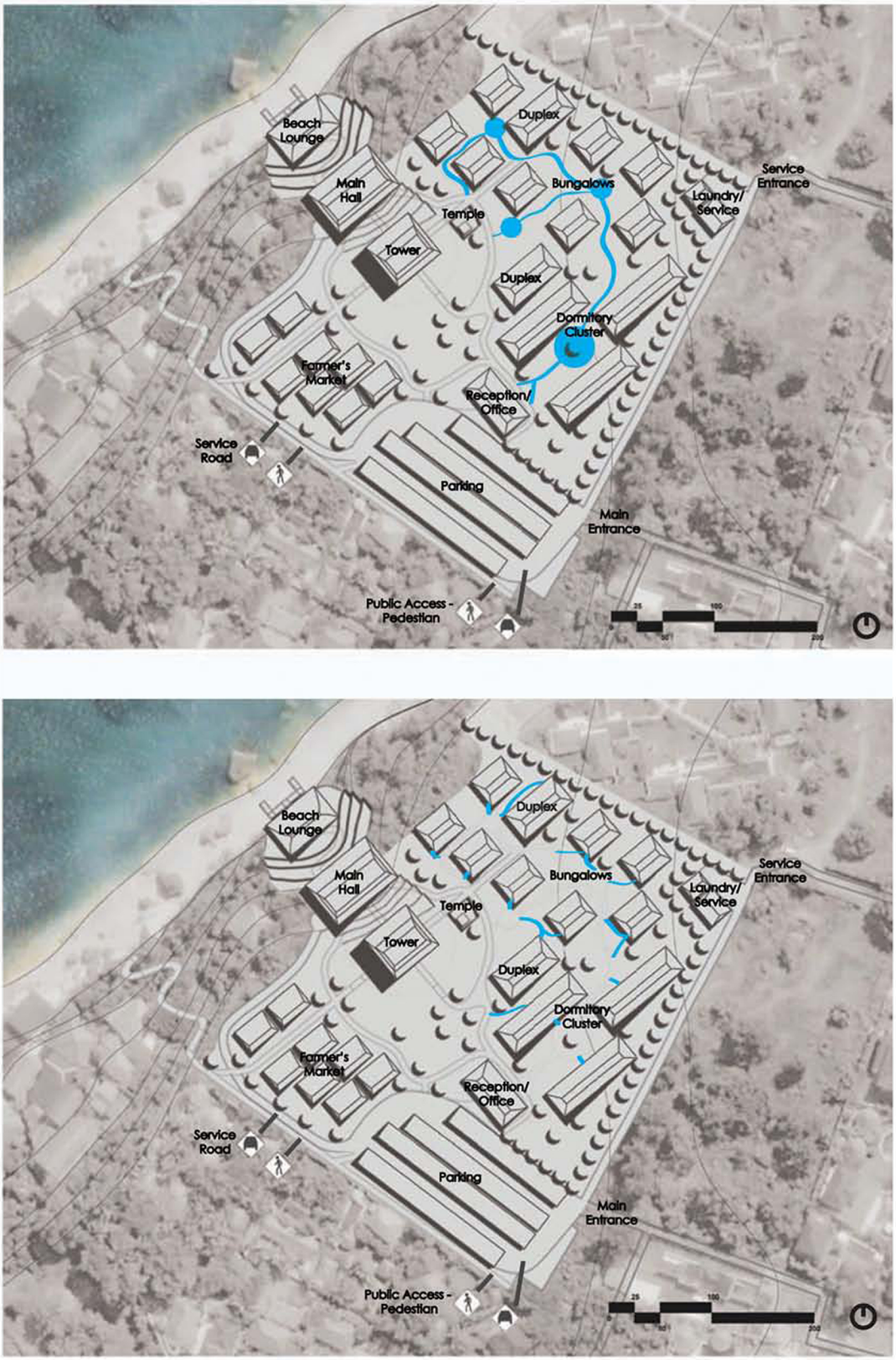


Figure 50. Circulation - Private

1. Back of House

a) "Wet Kitchen"

250 ft^2

Separated from restaurant space because of strong spices and heat

b) Laundry Facilities

300 ft^2

No toxic chemicals

No plastic bags

c) Office & Storage

1000 ft^2

Guest services, hotel operations, supplies storage, luggage storage

d) Loading/ Unloading

500 ft^2

2. Public

a) Parking

50 car stalls and approx. 30 scooters

PV panels over parking stalls

Free parking open to public and hotel guests

Access roads on 2 sides: SE & SW

b) Coastal Access

Open to public and hotel guests

Along SW side of site next to existing development

Lowest elevation on site in order to access beach more easily

Access to an excellent surfing wave

c) Farmer's Market

3,600 ft^2

PV panels on roofs
Open to public and hotel guests
Three times per week
Next to parking and access roads
Provide fresh locally grown produce to hotel guests and visitors
Provide income for local farmers

d) Temple

Open to public and hotel guests
Located in the northeast of the property towards Mt. Agung as is customary in Bali

3. Semi-Private - Hotel Guests

a) Viewing Tower

2,500 ft^2
Hotel guests can check the surf
Seating, hammock
Ground level – main circulation intersection

b) Shared Kitchen & Dining

Main Hall – Level B
2,280 ft^2
Hotel guests can prepare own meals with food purchased at Farmer's Market

c) Restaurant/ Lounge

Main Hall – Level 1
2,280 ft^2
Uses locally grown produce
Preparation area for dishes that don't require cooking
Seating, tables, daybeds, hammock

d) Beach Lounge

1,270 ft^2

Showers, seating, tables, daybeds

e) Equipment Storage & Maintenance

120 ft^2

Covered secured area for surfboard & watersport equipment storage

Beach level for convenience

On site surfboard ding repair

f) Coastal Access

For hotel guests only

g) Gardens/ Outdoor Leisure

Landscaping with permeable surfaces

Shaded lounging areas - seating, tables, hammocks

4. Private – Guest Accommodations

Roofed area = 11,008 ft^2

Maximum number of guests = 72

a) Bungalows

1 - 2 people

8 individual buildings

2 people per unit = up to 16 people

590 ft^2 each = 4,720 ft^2

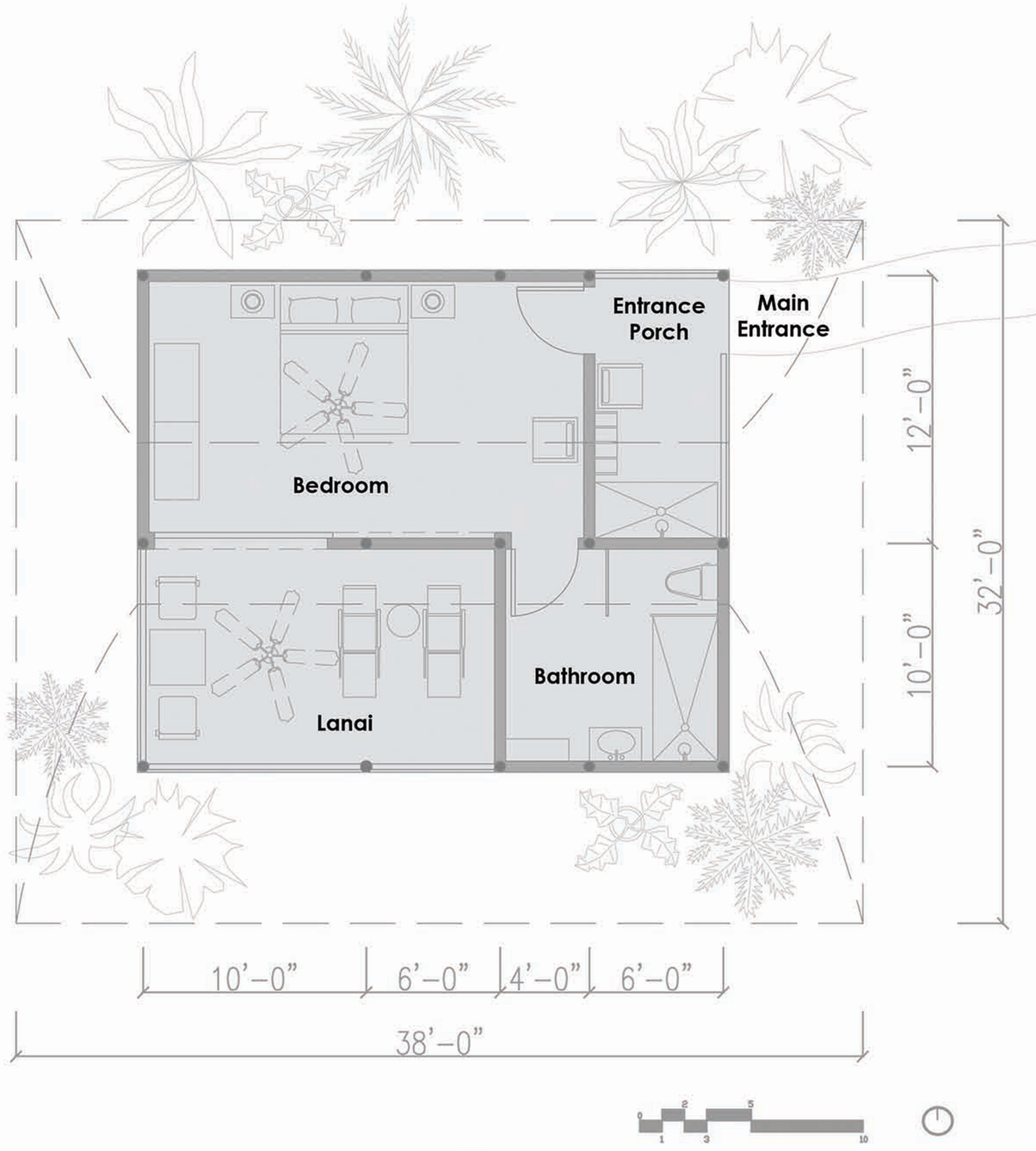


Figure 51. Floor Plan - Bungalow

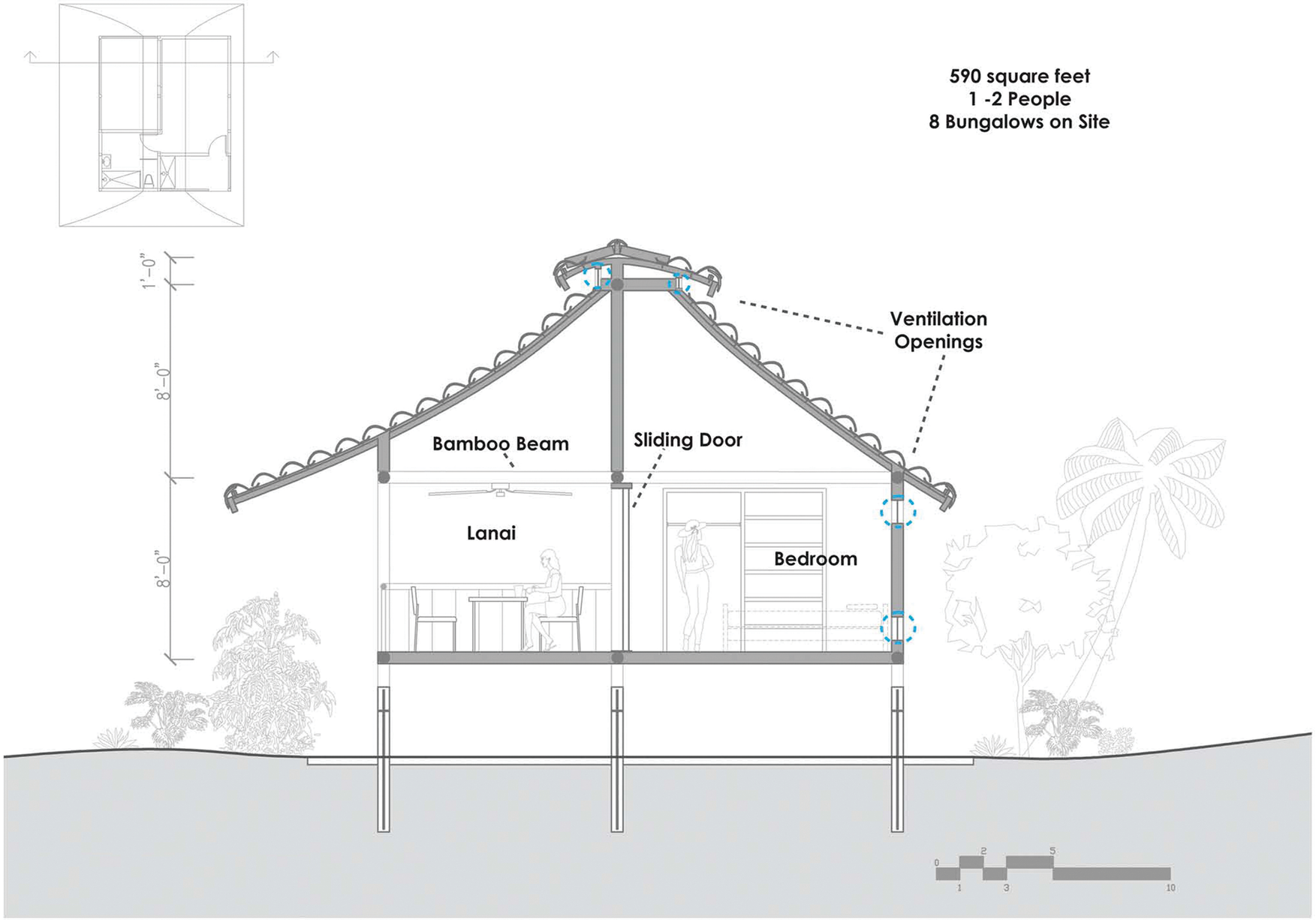


Figure 52. Section - Bungalow

b) Duplex/ Convertible

2 – 4 people

2 Duplexes / convertible buildings

4 people per duplex = up to 8 people

765 ft^2 each = 1,530 ft^2

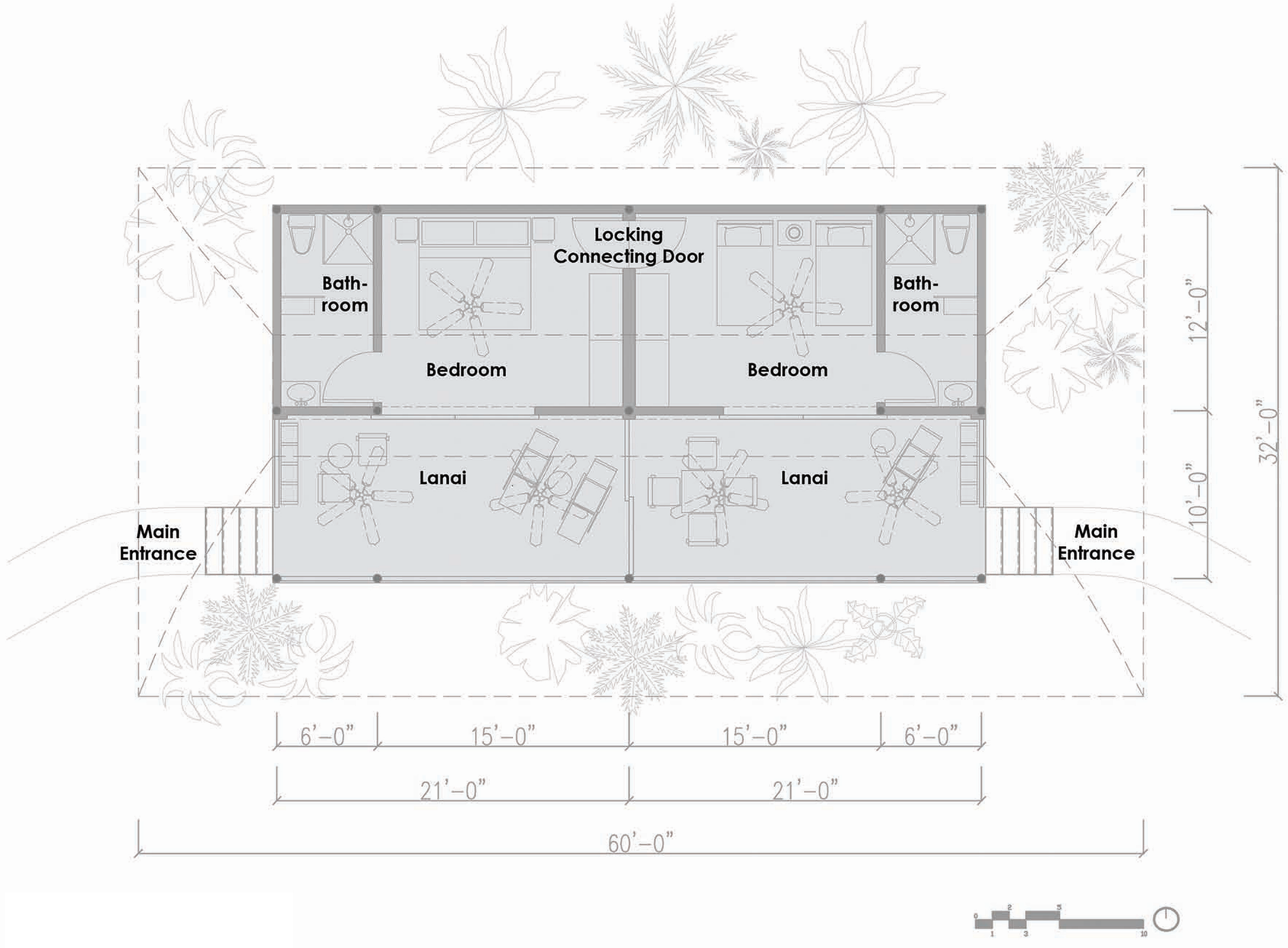


Figure 53. Floor Plan - Duplex

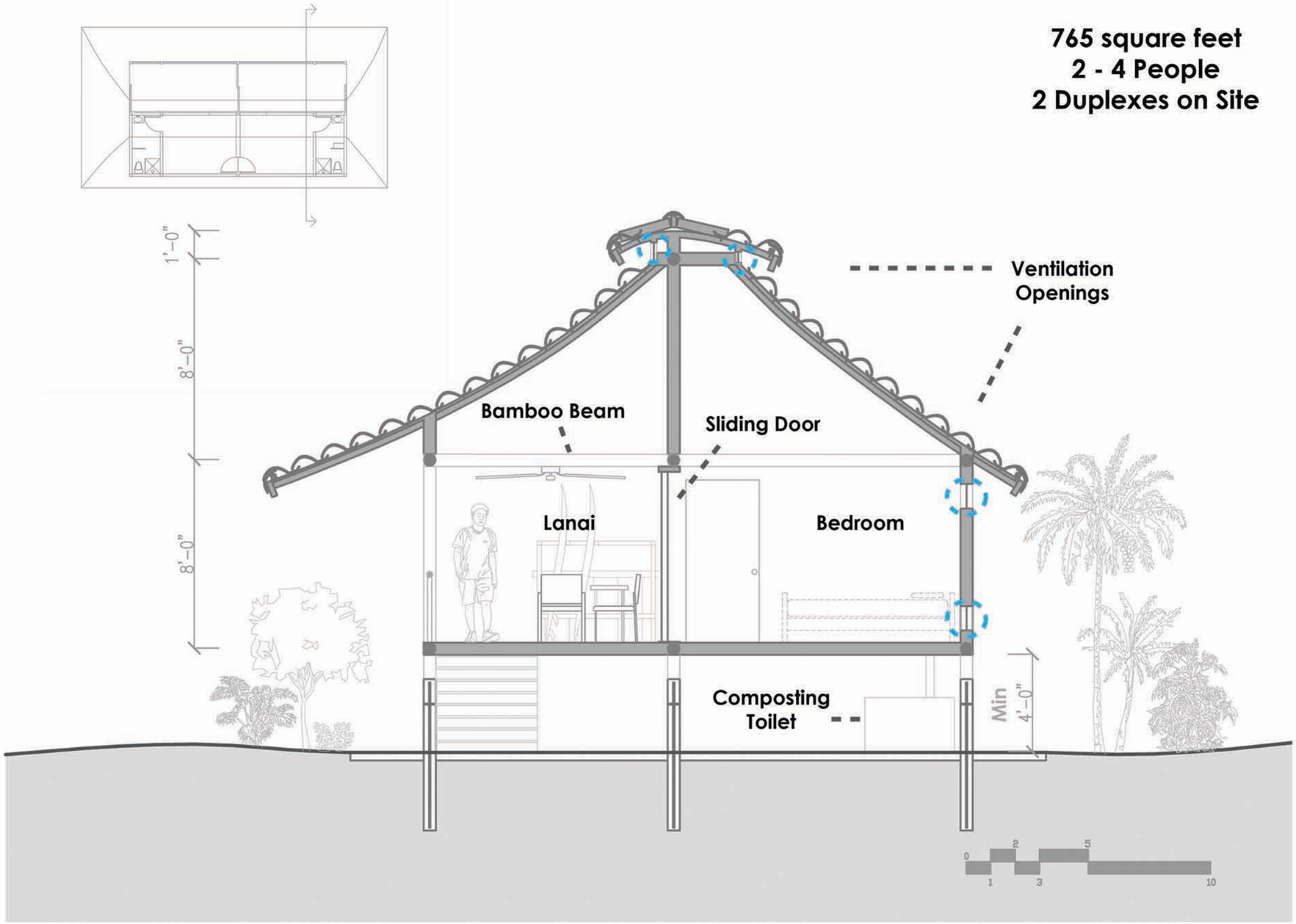


Figure 54. Section - Duplex

c) Dormitory/ Shared

Up to 16 people

3 dormitory/ shared buildings

16 people per unit = up to 48 people

1,586 ft^2 each = 4,758 ft^2

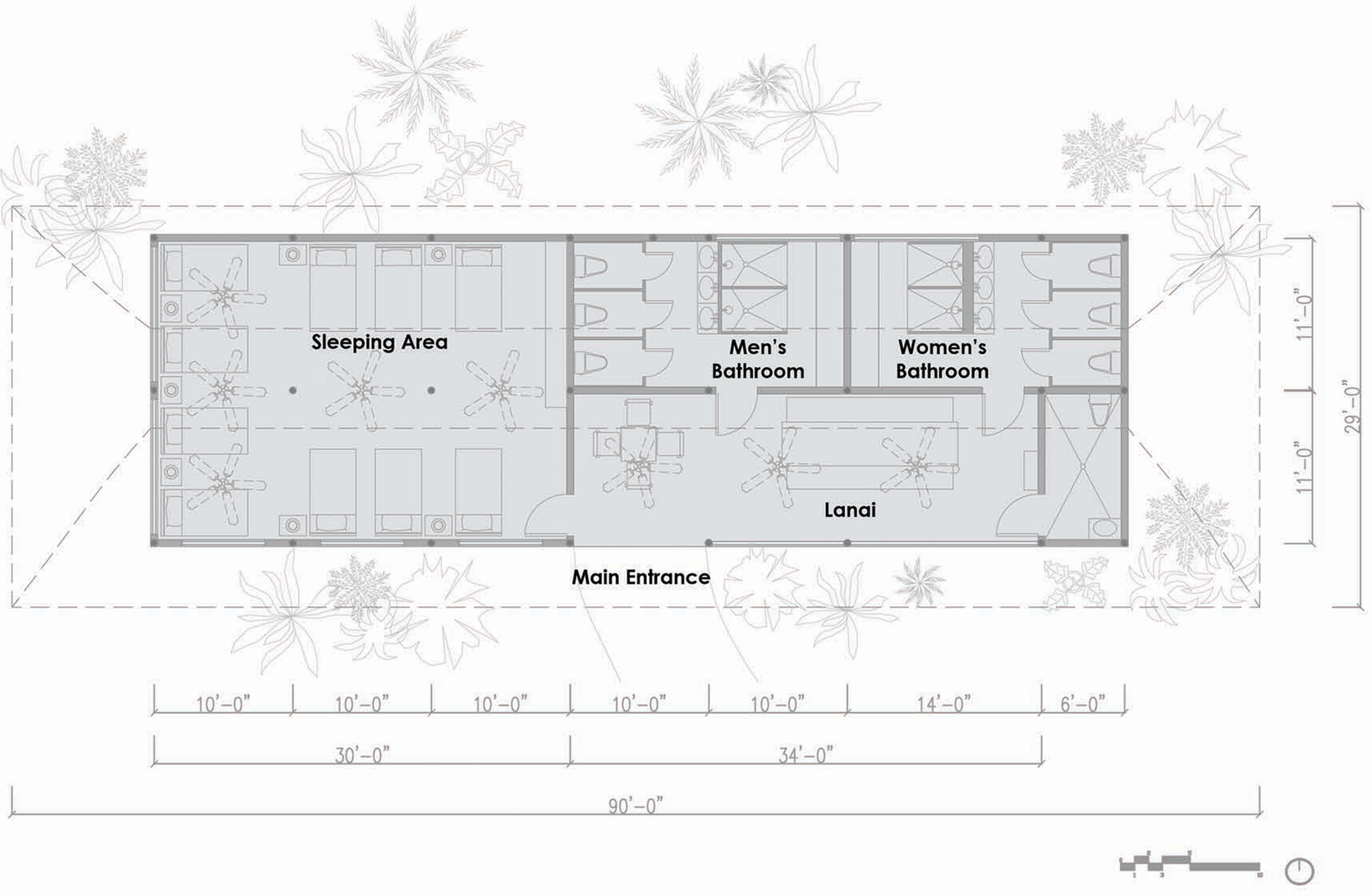


Figure 55. Floor Plan - Dormitory

1586 square feet
Up to 16 People
3 Dorms on Site

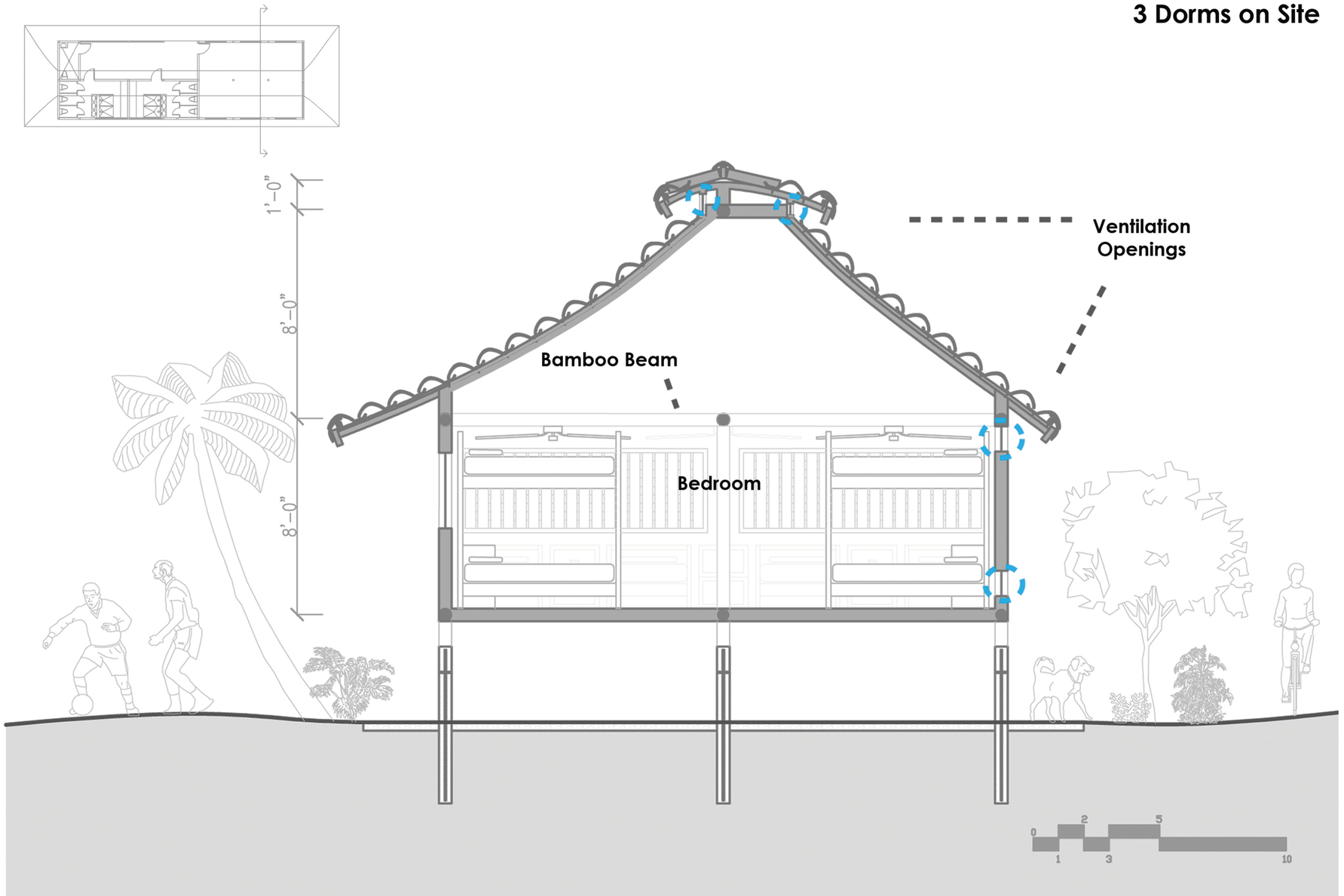
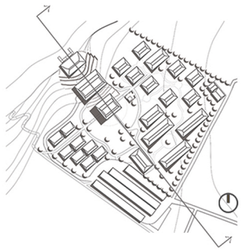


Figure 56. Section - Dormitory



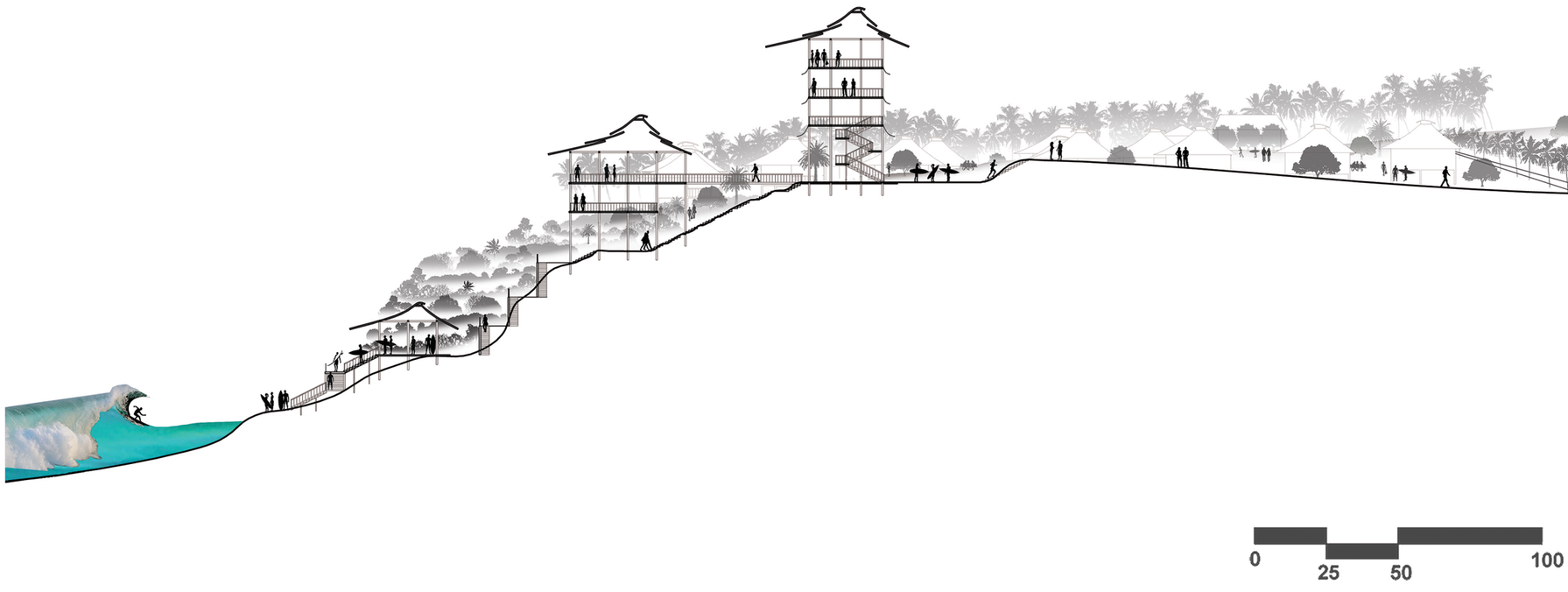
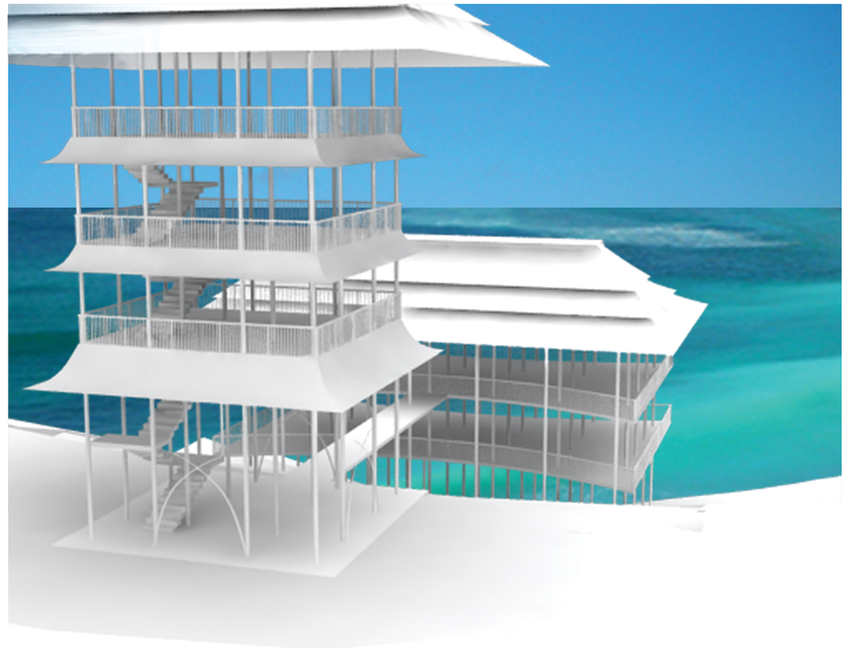
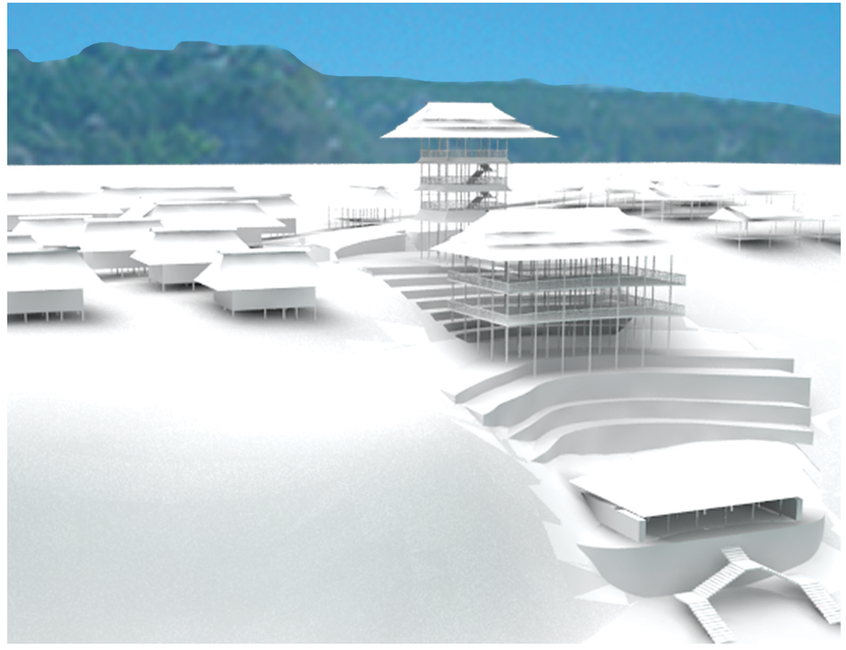
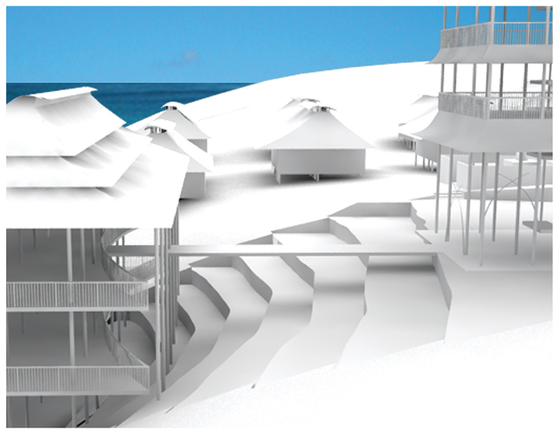


Figure 57. Section - Longitudinal







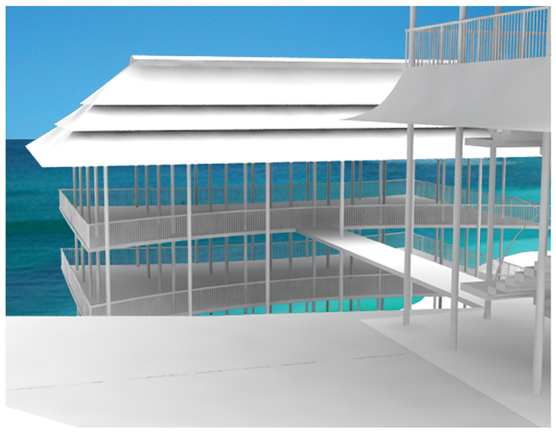


Figure 58. Rendering

VII. Conclusions

Surf tourism has had a significant impact on the coastal development on Bali. There is a correlation between the influx of surf tourists and the acceleration of development along the coast. Some areas of coastal Bali have transformed dramatically. Kuta's first hotel was started by a surfer in the 1930's.[285] Despite the government's plans for areas of higher priced accommodations, the local Indonesians responded to the demand from budget travelers, including many Australian surfers, by opening family run *losmen*. Small scale development in areas outside of Kuta near good surf breaks followed. Some of these areas, such as Bingin, are not ideal sites for typical tourism development; they're desirable for surf tourists. Today there is expanding large and small scale development throughout the southern coast.

Coastal development in Bali has had a negative impact on the environment. The amount of freshwater consumed by tourism development is depleting the island's supply and impacting everyone. Current waste disposal practices are insufficient to keep up with the amount of trash generated. The lack of sewage disposal infrastructure or inadequate systems has resulted in groundwater contamination. The coastal development is also threatening the coral reefs around Bali which are an important part of the ecosystem, as well as being an attraction for tourists. Tourism also requires a large amount of power. The majority of Indonesia's power comes from coal which is polluting to the air when burned.

The main positive aspect of tourism is that it provides income. Development that is built, owned and run by local Indonesians is the most beneficial to the local economy. Projects funded and owned by outside companies take much of the profits out of the Indonesian economy.

My design for a hotel takes into account the information obtained through the surveys of surf tourists and reduces the impact of building on the coast in Bali. The use of natural resources is limited through measures that both reduce consumption and use what is on the site. Construction materials can be obtained locally on Bali.

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[285] Leonard Lueras, and Lorca Lueras, *Surfing Indonesia* (Singapore: Periplus Editions (HK) Ltd, 2002), 37.

The methods of construction are common in Bali so that it can be performed by local craftsmen which also keeps the income in Indonesia.

This research is building upon studies about tourism in general and some limited studies of surf tourism. The small sample group surveyed is a start in understanding surf tourism but points to the need for a much larger number of respondents in order to be statistically significant. More data could reveal the behaviors of surf tourists which could be used in a variety of applications. Differences in areas such as gender, buying power and country of origin could be studied further in order to get a more accurate picture of the surf tourist.

Bali could benefit from more detailed data about why tourists are visiting in order to shift policies and practices to protect those assets that are the drivers of tourism if they want to make tourism their primary economic source. The cultural impact of surf tourism versus mass tourism would also be revealing.

Surf tourism is a growing industry and its impact is not fully understood at this point. Further research is necessary in order to gauge the economic, cultural and environmental impact that it has throughout the world; especially developing nations. With the right planning and management, surf tourism can be a positive catalyst for responsible development at surf destinations around the world.

VIII. Appendix A - Definitions

Banjar: village leader

Lineup: the optimal zone in the ocean where surfers sit to catch waves

Losmen: structures originally built inside family residential compounds, run by the family, specifically for tourist accommodations not migrants

Peak: the area of the wave that breaks first

Surf Break or Break: the area of ocean where a wave breaks; each one has a unique name and characteristics

Surfing: the act of riding a wave with a surfboard, body board, stand up board or no board where the person is propelled by harnessing the wave's energy

Surf Tourist: a person who actively participates in the sport of surfing for pleasure, not income, and is away from home at least one night but not more than three months

IX. Appendix B – Survey from Bali

Paper surveys were given in person on the island of Bali at various surf spots between January and February 2015. The surveys were given to people observed surfing in Bali who were at least 18 years of age and who do not reside on Bali. The results are aggregated. The Stata Code was assigned to the answers in order to run analysis using the Stata 14.0 program.

#	Question	Stata Code	Answer	# of Responses	Mode
1	**Which category below includes your age?**			**61**	**18 - 25**
		1	18-25	27 (44%)	
		2	26-35	19 (31%)	
		3	36-45	14 (23%)	
		4	46-55	0 (0%)	
		5	56-65	0 (0%)	
		6	66 or older	1 (2%)	
2	**Are you male or female?**			**61**	**Male**
		1	Male	47 (77%)	
		2	Female	14 (23%)	
3	**In what country do you currently reside? (please fill in the blank)**			**61**	**Australia/ Russia**
			Australia	9 (15%)	
			Russia	9 (15%)	
			France	7 (11%)	
			Sweden	5 (8%)	
			Italy	4 (7%)	
			UK	4 (7%)	
			USA	4 (7%)	
			Spain	3 (5%)	
			Switzerland	3 (5%)	
			Germany	2 (3%)	
			Argentina	1 (2%)	
			Austria	1 (2%)	
			China	1 (2%)	
			Finland	1 (2%)	
			Japan	1 (2%)	
			Morocco	1 (2%)	
			The Netherlands	1 (2%)	
			Portugal	1 (2%)	
			Singapore	1 (2%)	
			Slovenia	1 (2%)	
			No Answer	1 (2%)	
4	**Is this your first trip to Bali?**			**61**	**No**
		1	Yes	29 (48%)	
		2	No	32 (52%)	
5	**Did you arrange your trip to Bali through a tour operator?**			**61**	**No**
		1	Yes	6 (10%)	
		2	No	55 (90%)	
6	**How long will you be staying in Bali?**			**61**	**More than 4 weeks**
		1	Less than 1 week	2 (3%)	
		2	1 week	2 (3%)	
		3	1-2 weeks	10 (16%)	
		4	2-4 weeks	19 (31%)	
		5	More than 4 weeks	28 (46%)	
7	**What is the purpose of your visit to Bali?**			**63***	**Vacation / pleasure**
		1	Vacation / pleasure	53 (84%)	
		2	Other (please fill in the blank)	10 (16%)	
8	**How many people are you traveling with (do not include yourself)?**			**61**	**0**
		1	0	21 (34%)	
		2	1	15 (25%)	
		3	2	9 (15%)	
		4	3	8 (13%)	
		5	4	7 (11%)	
		6	5	0 (0%)	
		7	6 or more	1 (2%)	

9	**Please estimate how much you and your group plan on spending in Bali per person per day. Include accommodations, food, ground transportation, tours and souvenirs; do not include airfare. (Note: amounts in Indonesian Rupiah)**			**61**	**300.000 - 600.000 IDR**
		1	0 - 300.000 IDR	17 (28%)	
		2	300.000 - 600.000 IDR	25 (41%)	
		3	600.000 - 1.200.000 IDR	9 (15%)	
		4	1.200.000 - 1.800.000 IDR	6 (10%)	
		5	1.800.000 - 2.400.000 IDR	2 (3%)	
		6	2.400.000 - 3.000.000 IDR	0 (0%)	
		7	Over 3.000.000 IDR	2 (3%)	
10	**Will you or did you surf during your visit to Bali?**			**61**	**Yes**
		1	Yes	60 (98%)	
		2	No	1 (2%)	
11	**How many people traveling with you will surf during your visit to Bali (do not include yourself)?**			**61**	**1**
		1	0	19 (31%)	
		2	1	22 (36%)	
		3	2	9 (15%)	
		4	3	8 (13%)	
		5	4	2 (3%)	
		6	5	0 (0%)	
		7	6 or more	1 (2%)	
12	**Is surfing your primary motivation for visiting Bali?**			**62***	**Yes**
		1	Yes	36 (58%)	
		2	No	26 (42%)	
13	**How often, on average, do you take vacations where surfing is the primary motivation and you are away from home at least 1 night but not more than 3 months?**			**61**	**More than once per year**
		1	More than once per year	21 (34%)	
		2	Once per year	19 (31%)	
		3	Once in 3 years	4 (7%)	
		4	Once in 5 years	0 (0%)	
		5	Once in 10 years	2 (3%)	
		6	Less than once in 10 years	4 (7%)	
		7	Never	11 (18%)	
14	**When choosing accommodations while on vacation, how important are the following factors?**				
	a. Price			**61**	**Very Important**
		1	Unimportant	3 (5%)	
		2	Somewhat Unimportant	3 (5%)	
		3	Neutral	7 (11%)	
		4	Somewhat Important	21 (34%)	
		5	Very Important	27 (44%)	
	b. Service			**61**	**Somewhat Important**
		1	Unimportant	3 (5%)	
		2	Somewhat Unimportant	9 (15%)	
		3	Neutral	18 (30%)	
		4	Somewhat Important	21 (34%)	
		5	Very Important	10 (16%)	
	c. Safety (personal & property)			**62***	**Somewhat Important**
		1	Unimportant	1 (2%)	
		2	Somewhat Unimportant	5 (8%)	
		3	Neutral	14 (23%)	
		4	Somewhat Important	27 (44%)	
		5	Very Important	15 (24%	
	d. Amenities (parking, pool, wifi, restaurant, etc.)			**61***	**Somewhat Important**
		1	Unimportant	7 (11%)	
		2	Somewhat Unimportant	6 (10%)	
		3	Neutral	16 (26%)	
		4	Somewhat Important	24 (39%)	
		5	Very Important	8 (13%)	
	e. Aesthetics (architecture, decor, grounds)			**60***	**Somewhat Important**
		1	Unimportant	7 (12%)	
		2	Somewhat Unimportant	8 (13%)	
		3	Neutral	17 (28%)	
		4	Somewhat Important	23 (38%)	
		5	Very Important	5 (8%)	
	f. Proximity to surf breaks			**58***	**Somewhat Important**
		1	Unimportant	3 (5%)	
		2	Somewhat Unimportant	4 (7%)	
		3	Neutral	14 (24%)	
		4	Somewhat Important	21 (36%)	

	5	Very Important	16 (28%)	
g. Proximity to shopping, restaurants, nightlife			**60***	**Somewhat Important**
	1	Unimportant	10 (17%)	
	2	Somewhat Unimportant	10 (17%)	
	3	Neutral	16 (27%)	
	4	Somewhat Important	19 (32%)	
	5	Very Important	5 (8%)	
h. Reviews or recommendations			**59***	**Somewhat Important**
	1	Unimportant	5 (8%)	
	2	Somewhat Unimportant	5 (8%)	
	3	Neutral	11 (19%)	
	4	Somewhat Important	23 (39%)	
	5	Very Important	15 (25%)	
15	**When choosing a destination for a surf vacation, how important are the following factors?**			
a. Wave quality			**59***	**Very Important**
	1	Unimportant	2 (3%)	
	2	Somewhat Unimportant	0 (0%)	
	3	Neutral	6 (10%)	
	4	Somewhat Important	19 (32%)	
	5	Very Important	32 (54%)	
b. Friendly locals			**57***	**Somewhat Important**
	1	Unimportant	1 (2%)	
	2	Somewhat Unimportant	3 (5%)	
	3	Neutral	10 (18%)	
	4	Somewhat Important	25 (44%)	
	5	Very Important	18 (32%)	
c. Lack of crowds at the surf breaks			**58***	**Somewhat Important**
	1	Unimportant	2 (3%)	
	2	Somewhat Unimportant	2 (3%)	
	3	Neutral	19 (33%)	
	4	Somewhat Important	21 (36%)	
	5	Very Important	14 (24%)	
d. Unknown / unpopular surf breaks			**56***	**Neutral**
	1	Unimportant	4 (7%)	
	2	Somewhat Unimportant	3 (5%)	
	3	Neutral	25 (45%)	
	4	Somewhat Important	19 (34%)	
	5	Very Important	5 (9%)	
e. Well known / popular surf breaks			**58***	**Neutral**
	1	Unimportant	7 (12%)	
	2	Somewhat Unimportant	7 (12%)	
	3	Neutral	26 (45%)	
	4	Somewhat Important	15 (26%)	
	5	Very Important	3 (5%)	
f. Safety (personal & property)			**58***	**Somewhat Important**
	1	Unimportant	0 (0%)	
	2	Somewhat Unimportant	2 (3%)	
	3	Neutral	17 (29%)	
	4	Somewhat Important	26 (45%)	
	5	Very Important	13 (22%)	
g. Price			**59***	**Somewhat Important**
	1	Unimportant	0 (0%)	
	2	Somewhat Unimportant	1 (2%)	
	3	Neutral	16 (27%)	
	4	Somewhat Important	29 (49%)	
	5	Very Important	13 (22%)	
h. Weather			**59***	**Somewhat Important**
	1	Unimportant	1 (2%)	
	2	Somewhat Unimportant	3 (5%)	
	3	Neutral	14 (24%)	
	4	Somewhat Important	24 (41%)	
	5	Very Important	17 (29%)	
i. Proximity to home			**58***	**Neutral**
	1	Unimportant	11 (19%)	
	2	Somewhat Unimportant	10 (17%)	
	3	Neutral	18 (31%)	
	4	Somewhat Important	16 (28%)	
	5	Very Important	3 (5%)	
j. Unique culture			**57***	**Somewhat Important**
	1	Unimportant	3 (5%)	
	2	Somewhat Unimportant	3 (5%)	
	3	Neutral	22 (39%)	
	4	Somewhat Important	23 (40%)	
	5	Very Important	6 (11%)	

k.	**Health (clean water, low pollution)**		**58***	**Somewhat Important**
	1	Unimportant	1 (2%)	
	2	Somewhat Unimportant	4 (7%)	
	3	Neutral	10 (17%)	
	4	Somewhat Important	27 (47%)	
	5	Very Important	16 (28%)	
l.	**Reviews or recommendations**		**60***	**Somewhat Important**
	1	Unimportant	5 (8%)	
	2	Somewhat Unimportant	4 (7%)	
	3	Neutral	20 (33%)	
	4	Somewhat Important	22 (37%)	
	5	Very Important	9 (15%)	
m.	**Modern amenities**		**58***	**Neutral**
	1	Unimportant	6 (10%)	
	2	Somewhat Unimportant	6 (10%)	
	3	Neutral	30 (52%)	
	4	Somewhat Important	11 (19%)	
	5	Very Important	5 (9%)	
n.	**Availability of a variety of non surfing activities**		**58***	**Somewhat Important**
	1	Unimportant	6 (10%)	
	2	Somewhat Unimportant	9 (16%)	
	3	Neutral	17 (29%)	
	4	Somewhat Important	22 (38%)	
	5	Very Important	4 (7%)	

16	**Would you be willing to pay a fee to surf a break if it limited the number of surfers allowed in the water at one time?**	**62***	**No**
	Why or why not? (Note: respondents wrote answers on paper, researcher transcribed answers)		

1	**Yes**	**24 (39%)**
	Yes if cheap	
	Yes, would go surfing if there were fewer surfers in the water, it's very dificult to take waves when there are a lot of surfers.**	
	Mostly so that you don't have to pay attention to others, just focus on yourself.	
	To get a better experience	
	Sometimes it turns out to be hard finding an uncrowded spot	
	Happy to support local community and for better surf experience	
	More waves	
	Less crowd equals good times	
	Crowds are dangerous	
	To keep surfers/swimmers safe; the money went to preservation/ keeping the beach clean (e.g. like a national park)	
	Can be worth it	
	I would be willing if I had to, but I do not want to see that day	
	So I can surf alone	
	Because we come away to be away from the crowds.	
	To get more waves	
2	**No**	**38 (61%)**
	I just go to some other spots. I'm still quite a beginner so not that important to me.	
	I'm a beginner, never been to a spot where there are too many people. I'm fine with small waves.	
	Surfing should be free	
	According to Bali there are not a lot of surfers in the water at one time. If I am a millionaire. I'd like to pay for this service in Europe.	
	Will find another spot	
	Don't care, crazy to pay for surf	
	I'm not good enough at surfing but if I was I might pay	
	It's stupid	
	You should not have to pay to surf	
	I'm not going to pay to surf!	
	Even if there are few surfers, they can still be kooks and therefore reducing the fun	
	Surfing is free(dom), sharing is important	
	Think it would kill the sport and it already is happens with common sense to make it not really busy	
	Because ocean is for everybody. We have same passion and have to accept evolution in the surf.	
	Surfing is a source of freedom, sharing, it is natural and the concept of money has no place in this environment.**	
	Because I prefer change of spot/ the ocean is for all the people	
	Water is free. That's why is good. Whenever I prefer change the surf break more quiet.	
	Ocean is not property for humans to own and make money with	
	Surfers don't pollute the water directly, therefore I can't see a reason for a fee.	
	Cause surfing is also relationship and meeting locals and nice people in general	
	Personal point of view	
	Cause I pay much money for surf lessons or for surfing equipment rental	
	I think water is for everybody	
	It actually depends how crowded the break is, but you can always find spots that are less crowded. But surf is getting more popular and it might be a option for the future or very popular spots.	

		The water is for everybody!		
		No need		
17	**Would you visit Bali again?**		**60***	**Yes**
	Why or why not? (Note: respondents wrote answers on paper, researcher transcribed answers)			
	1	**Yes**	**57 (95%)**	
		Work, good surf, nice food & people, good weather, cheap		
		Great country, nice locals, lots of things to do (surfing, diving…)		
		I love coming, relaxing		
		Surfing		
		Because I have been in Gili Island, and that's the best place in my life where I have been.		
		Cheap, relatively clean, nice culture/people, good waves & beautiful		
		Amazing culture, friendly locals, nice nature, good waves and weather/climate, rather cheap.		
		Being here two years in a row - great mix of sport/leisure/culture		
		Yes I would if traveling in Indo area or Aus but wouldn't have Kuta or similar places as a primary goal/stay for the trip. I'd go to the islands (ex. Lembongan)		
		Good weather, good choice of other activities.		
		It's cool		
		Great beaches, surf, accommodation & food		
		It's beautiful		
		Because it's beautiful		
		It is beautiful, the people are so nice and I love the food		
		Cheap & good waves		
		It's cheap & the waves are great		
		Surf is good, life is cheap		
		Surf weather ambient culture		
		Great place to live		
		It's not very expensive, & you can get a lot of value for your money. I enjoy the food & the beaches. I would not return b/c of traffic, pollution, & overpopulation. But yes, generally, I would visit again.		
		Liked it very much! Food, the people, weather, volcanos, and so much more		
		It is fantastic!		
		Because I have business here and also my son is mise French/ Indo.		
		the good waves and climate		
		To see other links		
		Because this is my real home!		
		Nice wave, nice people and nice culture		
		So many things to do. Dive, surf, food, sleep.		
		It is unique and the variety of activities & proximity to unique islands is alluring.		
		Good waves and safe, good vibe		
		Beautiful nature, nice people, relaxing atmosphere, seeing Lombok and Gili Islands		
		Culture, energy, friendly locals (in their own way), not expensive at all, nature, sunsets!, and of course surfing		
		Cause it's still a paradise, looking for new places all the time		
		Great atmosphere		
		Surf		
		Availability of activities, nature, climate		
		I love Bali		
		It's one of the best places to surf in the world, although its getting more and more touristic and I prefer other Indonesian Islands.		
		For sure, love this place!		
		Family, good surf		
	2	**No**	**3 (5%)**	
		Maybe just for few days and then to other islands		
		Too touristy & I prefer the latin american culture		

* Respondent checked more than one answer or left blanks; percentages based on actual number of answers
** Translated from French

X. Appendix C – Online Survey

Survey respondents were solicited online between August and November 2015. A link to the survey was posted on various surf related websites. The results are limited to people who surf that are at least 18 years of age. Results include some participants that did not complete the entire survey.

Summary Report - 20 November 2015
The Influence of Surf Tourism on Coastal Bali

1. Do you surf?		
Value	**Count**	**Percent**
Yes	113	100%

Statistics	
Total Responses	113

2. Which category below includes your age?		
Value	**Count**	**Percent**
18-25	16	14%
26-35	54	48%
36-45	31	27%
46-55	9	8%
56-65	2	2%
66 or older	1	1%

Statistics	
Total Responses	113

3. What gender are you?		
Value	**Count**	**Percent**
Male	81	72%
Female	32	28%

Statistics	
Total Responses	113

4. What country do you currently reside in?		
Value	**Count**	**Percent**
United States	50	45%
Germany	14	13%
Spain	7	6%
Australia	5	4%
Brazil	4	4%
Chile	4	4%
Portugal	3	3%
Switzerland	3	3%
Austria	2	2%
France	2	2%
Mexico	2	2%
United Kingdom	2	2%

Belgium	1	1%
Canada	1	1%
Dominica	1	1%
Greece	1	1%
Indonesia	1	1%
Israel	1	1%
Morocco	1	1%
New Zealand	1	1%
Peru	1	1%
Philippines	1	1%
Slovenia	1	1%
South Africa	1	1%
Thailand	1	1%
United Arab Emirates	1	1%

Statistics	
Total Responses	112

5. How often, on average, do you take vacations where surfing is the primary motivation and you are away from home at least 1 night but not more than 3 months?

Value	Count	Percent
More than once per year	47	42%
Once per year	30	27%
Once in 3 years	17	15%
Once in 5 years	4	4%
Once in 10 years	4	4%
Less than once in 10 years	3	3%
Never	7	6%

Statistics	
Total Responses	112

6. When choosing a destination for a surf vacation, how important are the following factors?

	Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Very Important	Total Responses
Wave quality	0 (0%)	2 (2%)	7 (6%)	38 (35%)	62 (57%)	109
Friendly locals	1 (1%)	4 (4%)	24 (22%)	48 (44%)	31 (29%)	108
Lack of crowds at the surf breaks	1 (1%)	0 (0%)	22 (21%)	47 (44%)	37 (35%)	107
Unknown / unpopular surf breaks	7 (6%)	13 (12%)	54 (50%)	21 (19%)	13 (12%)	108
Well known / popular surf breaks	6 (6%)	12 (11%)	50 (46%)	35 (32%)	5 (5%)	108
Safety (personal & property)	3 (3%)	9 (8%)	20 (18%)	53 (48%)	25 (23%)	110
Price	1 (1%)	2 (2%)	19 (18%)	53 (50%)	32 (30%)	107
Weather	3 (3%)	12 (11%)	18 (16%)	45 (41%)	32 (29%)	110
Proximity to home	31 (29%)	25 (23%)	28 (26%)	17 (16%)	7 (6%)	108
Unique culture	5 (5%)	12 (11%)	27 (25%)	47 (43%)	18 (17%)	109
Health (clean water, low pollution)	0 (0%)	6 (6%)	17 (16%)	44 (40%)	42 (39%)	109
Reviews or recommendations	5 (5%)	9 (8%)	37 (35%)	45 (42%)	11 (10%)	107
Modern amenities	17 (16%)	33 (31%)	35 (33%)	18 (17%)	4 (4%)	107
Availability of a variety of non surfing activities	15 (14%)	9 (8%)	30 (28%)	44 (40%)	11 (10%)	109

7. When choosing accommodations while on vacation, how important are the following factors?

	Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Very Important	Total Responses
Price	0 (0%)	4 (4%)	15 (14%)	44 (42%)	43 (41%)	106
Service	7 (7%)	10 (10%)	30 (29%)	47 (45%)	11 (10%)	105
Safety (personal & property)	3 (3%)	5 (5%)	15 (14%)	52 (49%)	31 (29%)	106
Amenities (parking, pool, wifi, restaurant, etc.)	16 (15%)	22 (21%)	24 (23%)	38 (36%)	6 (6%)	106
Aesthetics (architecture, decor, grounds)	17 (16%)	21 (20%)	26 (25%)	36 (34%)	6 (6%)	106
Proximity to surf breaks	0 (0%)	2 (2%)	6 (6%)	40 (38%)	57 (54%)	105
Proximity to shopping, restaurants, nightlife	18 (17%)	25 (24%)	30 (28%)	29 (27%)	4 (4%)	106

Reviews or recommendations	8 (8%)	10 (10%)	27 (26%)	46 (44%)	14 (13%)	105

8. Would you be willing to pay a fee to surf a break if it limited the number of surfers allowed in the water at one time?

Value	Count	Percent
Yes	40	39%
No	62	61%

Statistics	
Total Responses	102

Why or why not? (fill in the blank)
All surf breaks r crowded now and not everyone understands respect to others
Assuming it would be less crowded.
Beach breaks are free!!! dont comercialize surf!!!
Because I can afford it.
Because I would be able to surf a lot more waves.
Because surfing have to be free !
Because surfing in free .
Breaks should be public property
Depends on the price of the fee. If cheap, yes.
Dont know for shure
Fee weeds out crowd...more waves.
Fees are normally associated with needing boats, etc.
Forgot the previous question
Getting away from crowds is a driving factor of traveling to surf.
I am old school. One of the first to ever surf J-Bay. Bosco
I could for scape of the crowd
I don t remember the question
I don't like the idea, just like paying to go to the beach.
I dont think its fair
I enjoy surfing the most in non-crowded breaks.
I pay a lot of money to surf... I dont want to pay more
I would if the money would benefit locals.
I'd rather not have to pay for something that should be free for everyone.
I've become less hardcore over the years so crowds are not as bothersome to me.
If it was used to keep the break and the surrounding areas clean and free of waste.
If it's pumping and not too expensive
It should be free
It's less stressful to get waves
Just watch any clip from Malibu in Cali. Self Explanatory .
MONeY, give a shit about
Natural surfbreaks should never be limited in access through money
Nature is for free and for everyone. Paying is not helping anyone.
No one should have to pay to surf.
Once people start charging to use beaches it's all over.
Quality of the wave
Surf should be free and for everyone, not for the ones who can afford more money!
Surfing is free from nature
Surfing is free sport using matural sources, paying for them would make it less natural
Surfing should be always free
Surfing should be free for all and nobody should gain preference because they have money.
Takes away freedom from the proletariat.
That sounds more like a Disney trip, stay in line waiting for your turn to ride. Boring!
The sea belongs to everyone and it cannot be bought or sold!
The sea its free
The sea should be a universal resource
There is always a less crowded spot if you willing to search for it
To have a Better surfing experience
To limit the crowd and increase my wave count
Wave count and friends are the two best measure units to rate a surf trip
Waves should be free for everybody
Would formalize surfing and give me an artificial impression
as long as its not too much money
because i would catch more waves
i dont like pay for free or simple thinks
jcxn lj
once crowd is getting bigger maybe it´s an option
sdfdddsf xfgdsg fgdf rsfgdf dfgdf
sure safer that way
to whom would the money be given? The ocean is free, isn´t it?
yes if it is not so expensive, it permits to surf in good conditions (space, security, etc.)

Never, I surf because it makes me feel free and have good times with my friends, and also meet new people !

The ocean does not belong to anybody, it's not a swimming pool and should be available for everybody.

How about only members of Surf rider Foundation? We are already donating money to keep the clean water and safe for marine life.
Short answer - nobody's going to tell me when I can go out.

Part of the reason why surfing is such an amazing sport is because nature is generally free. I already have to start paying for parking and often times I wont surf my favorite break because I wont pay $10 to park. Lazy? No, but I can surf a free wave and save money and have heaps of fun still

Because there is no such thing as wave ownership. So we cannot charge a fee for enjoying it. Individuals can charge a fee to surf a tank wave in their private property, but not in the ocean.

Although it seems unethical because it would essentially reserve a wave for those who can afford it (i.e. visitors not locals)...if it existed, I'd probably do it because surf addiction trumps guilt (just ask my gf).

It's not property for someone to have dominion over. It's a resource for all to enjoy in their own way without cost

best things in life are for free...a two class society within the surfing community would be a shame. i think that somehow we already have it. some people can effort boat trips or expensive resorts others can't

I don't think the ocean should be regulated in that way. This might exclude those that can not pay. This may favor and give preference to wealthy people.

It wouldn't fairly allow people to surf. Money is not a fair representation of society. If quotas are allowed with a monetary value, the would prices would inflate and in the future only rich people would buy them. Instead of using money we can use a token system based on environmental conservation. You clean a beach or park or street for X hours then you get a quota.

Waves are for everybody and nobody should pay fees in order to surf. All people rich or otherwise should have the possiblity to surf!

I'm not sure about how well the money would be used, if it is for a good cause as maintaining the place preserved so maybe yes.

Because wave count is important. I surfed Tavarua twice in the 80's because of the guest limit. If I am spending money to surf somewhere else, I want to get waves

I'm still a beginner surfer and its had to share the waves sometimes with people that are better than me

That's not what surfing is about. I would rather see a parking charge or beach access charge vs a "surfing" charge.

You can't freaking comercialize the sea! You might limit the people in the water by reducing parking or closing roads but not by paying money... that's disgusting

Because i'm starting in surf and if i cant't surf a day because there are to much people, i think i can go to another place to have a good surf.

Surfing in crowds sucks. The worst would be to travel across the globe to surf crowded waves. You want to be able to surf those waves that you've paid so much money, in some cases, to access.

Because world is overpopulated and I don't want to have to get in a fight with a local over wave forms.

well, the less people on the water, the more waves for me and the less fighting for waves. At the same time for a little fee that doesn't hurt my budget, the locals can make some money which can be used for environmental or public purposes, such as reducing the water pollution, improvement of the infrastructure such as the installation of a wi-fi-hotspot, or the installation of a sewage system... etc. Those actions will directly help the local populations and indirectly the surfer, when he/she comes back and the water is cleaner, the infrastructure is improved and the most important thing: the waves are still empty when it's my time to surf!

You shouldn't have to pay to surf at a beach that has public access. And to regulate something like that requires more infrastructure like fences or guards. It would be nice to be able to control the amount of people in the water, but I don't think there are any feasible and successful options out there.

cause if im going to spend money to surf I may as well spend money to surf...:) depends on price tho' 100% dependent. 40.00 for 4 hours of just me and my friends is worth it.

Well it is kind of against the aloha soul but in Bali you are paying for parking your motorbike to get to the beach anyway, so I prefer to pay to limit the surfers rather than that.

Regulations would be a nightmare especially in countries that tend to be able to be bought off/poor. And who is to say how long and at what time of day (low vs. high tide)

Great surf is hard to fine when traveling in unknown places therefore you are seeking the help of travel guides who might be taking many tourists there for compensation. I would rather pay for a controlled place where I can get the best of the best waves and share them with my group of friends for a short time.

If it was reasonable. I've surfed at G-Land, where there are multiple surf camps, and it was ridiculously crowded.

I go back and forth on this, I see the potential value, but overall I vote no. It could result in very few people getting to surf on days when waves are best, people out in the wrong conditions, and makes surfing a commodity that can be bought and sold. One of the great things about it is it's still free to go put your board in the water.

Surfs free and always must be. Never wanna have anybody limiting me on when and where I
choose to surf

Depening on the Price of the fee. If not too much is required and the waves are good then a fee is reasonable in todays world. So many world class spots, not necessarily the most popular ones, but spots with world class waves require you to take a boat to the peak, for which you have to pay for. Such is the case with parking around surf spots. Even though these are vague comparisons, those are still aspects which should be taken into account as most surfers sacrifice some cash in their pocket in order to surf.

Surfing without a crowd is a better experience and worth money but I do not think we have the right to disallow people from entering a surf break for profit to others.

Stupid idea! And then the money is going again to the rich and the westeners who call them «locals»? Nobody should have to pay to enjoy nature. Find other solutions please...

I don't think someone should own the ocean and have control over who gets to utilize it. The ocean is a public trust resource and should not be up for sale. Tavarua is a great example of how charging for access can make surf breaks "elitest" where only the wealthiest get to use the resource.

In Indonesia, and some other places, there is surf camps w/ private waves, also, G-land drop in is not allowed

the sea belongs to everybody, you cant restrict people to go into the water. that goes againts what surf its all about. greatings.

Because that means that the surf breack is exclusive and I believe in public and open oceans/seas/breaks

No, I do not encourage the establishment of such practice. Wave access to public is something to preserve.

Because waves should be free for everybody. I´m already willing to pay for a travel cost which in my maind is equal to get to the place and surf at anytime I want. It is a very controversy point. What if I pay to surf in the mornig and waves are bad... then, 2 hours latter or in the arfernoon it start to pummping... I have to pay again? I think people can profit with the waves and that isn´t correct for me... Surfers spend their money with the local comunity, there is the local support. About the loading capacity of a surf spot as an natural resouse... well I think it is a very complicated topic to discuss

It would open a can of worms but there are world class breaks that are crowded 24/7 and everyone dreams about catching them with just a few people out. If you could pay a fee and surf them uncrowded it would take away the hassling and lower the danger factor.

surfing is about freedom.... i would not be free in the water if i know i have only a certain of time because i paid for one hour.
also..if i check a spot and it is too busy, then i wait or go somewhere else.
Mothers natures gift should be open to all to share and not commercialized. Exclusivity by fee will create a social economic rift in access. Case in point hanauma. But this example can be debated different ways

9. Have you ever been to Bali, Indonesia?		
Value	**Count**	**Percent**
Yes	53	52%
No	49	48%

Statistics	
Total Responses	102

10. Approximately how many times have you been to Bali?		
Value	**Count**	**Percent**
1	21	40%
6 or more	14	27%
3	7	14%
4	4	8%
2	4	8%
5	2	4%

Statistics	
Total Responses	52

11. Did you arrange your trip to Bali through a tour operator?		
Value	**Count**	**Percent**
Yes	2	4%
No	50	96%

Statistics	
Total Responses	52

12. How long did you stay in Bali? (If multiple trips please give an average)		
Value	**Count**	**Percent**
2-4 weeks	20	39%
More than 4 weeks	16	31%
1 week	6	12%
1-2 weeks	6	12%
Less than 1 week	4	8%

Statistics	
Total Responses	52

13. Did you surf during your visit to Bali?		
Value	**Count**	**Percent**
Yes	50	96%
No	2	4%

Statistics	
Total Responses	52

14. Was surfing your primary motivation for visiting Bali?		
Value	**Count**	**Percent**
Yes	39	78%
No	11	22%

Statistics	
Total Responses	50

15. How many people went with you to Bali (do not include yourself)? (If multiple trips please give an average)		
Value	**Count**	**Percent**
0	13	25%
1	16	31%

2	13	25%
3	5	10%
4	3	6%
6 or more	2	4%

Statistics	
Total Responses	52

16. How many people traveling with you surfed during your visit to Bali (do not include yourself)? (If multiple trips please give an average)

Value	Count	Percent
0	13	25%
1	21	40%
2	8	15%
3	3	6%
4	4	8%
6 or more	3	6%

Statistics	
Total Responses	52

17. Please estimate how much you and your group spent in Bali per person per day. Include accommodations, food, ground transportation, tours and souvenirs; do not include airfare. (Note: amounts in Indonesian Rupiah and approximate US Dollar equivalent)

Value	Count	Percent
0 - 300.000 IDR (approx. 0 USD - 21 USD)	15	29%
300.000 - 600.000 IDR (approx. 21 USD - 42 USD)	14	27%
600.000 - 1.200.000 IDR (approx. 42 USD - 84 USD)	10	19%
1.200.000 - 1.800.000 IDR (approx. 84 USD - 126 USD)	5	10%
1.800.000 - 2.400.000 IDR (approx. 126 USD - 168 USD)	4	8%
2.400.000 - 3.000.000 IDR (approx. 168 USD - 210 USD)	3	6%
Over 3.000.000 IDR (approx. 210 USD or more)	1	2%

Statistics	
Total Responses	52

18. Would you visit Bali again?

Value	Count	Percent
Yes	45	87%
No	7	14%

Statistics	
Total Responses	52

Why or why not? (fill in the blank)
Bali is a nigthmare now (look at Dreamland ...)
But its really polluted! Full of unfriendly Australians and locals. I just like the spots
For sure, it´s one of the best places on earth.
Good waves, Nice hotels, beautiful place....
Great culture - but getting very crowded.
Great experience, would like to surf more.
Great place, friendly people.
High availability of Spots
I have many friends there
I live there since a few years
It was over crowded and over developed, they've ruined a beautiful place.
Its a perfect place for surfing.
Maybe

Surf, food, diving, friends live there The culture , warmth and scene.
Value for money, pretty much guaranteed good waves
Very nice waves And people
Waves are amazing and water is warm. Landscape is beautyful. People is friendly.
We loved it! People and culture were amazing.
Would go again, but never again in rainy season
Yes, but mainly as a passage to other islands. The water and the city were very dirty.
amazing culture, amazing places to discover, amazhingamazing people, great surf, cheap !
bc fgbd cgv sxgd dgsdf
because is an amazing place
dvakjsdv.LDSK LKJNLKN KNKL LKNLK NJ.
great culture, good waves
great waves beautiful place
it was one of my best trips ever...
the surf is grande!
too busy but never say never, I used as many people Bali as a stopover to other islands close like Sumbawa
Too busy, too many tourists, we went there a couple of days before going to Sumbawa, it was the worst place in Indonesia I visited (even if it should be a paradise 10 years ago). It's also really dirty, with an important water pollution. I was really disappointed, but I loved the other islands of Indo !!!
I'd just use it as a starting point to get to other islands now and not do weeks or months there anymore. It is too crowded.
I want to surf and discover other islands (lombok, sumbawa, sumatra or mentawais) Bali is too crowded even at the beginning of the season when I went. To much tourism and locals always trying to sell you things, I feel it has badly affected that place.
It's been years since I've been there. I loved it-culture, food, people, beauty, beaches--would love to return.
I would but I have a lot of trepidation about it. It's gotten way more crowded & expensive. Definitely not as good as experience as in the 90s
I would love to visit Bali in the 60ties... I'm interessed in surfing. The waves in Bali are toooo crowded and overrated, the further I go away from Bali tourism the happier I am and the more I experience the local vibe!
I lived in Bali in 1979 when it was a pristine paradise. My last trip 2 years ago really saddened me. Trash was everywhere and the island was being ruined by development. I still find Bali unique, but it's charm has been destroyed. I will only use it as a transit point for travel to other islands, The Balinese need to clean up the plastic trash and take steps to protect the environment, because I don't want to spend my money on a polluted crowded place
Culture and waves are perfect, it is a cheap destination that has a culture shock aspect that I crave
Bali just to depart to other spots around; first trip was early 1990, than 1996 and 2000, that place change a lot, was much less crowd and clean, nowadays only to Mentawai or surf camps, Kuta and Bali very crowd and polluted.
The people are some of the kindest on earth, the waves are amazing, the food is great, and the Islsnd is gorgeous.
Bali is very polluted and overpopulated. It could be a paradise but too many large building projects are ruining the coastlines. There is almost no waste recycling or water cleaning, which is not a good way to treat this precious land. All the roads are overpopulated: too many scooters, too much pollution. If Solar energy was used, it could be a huge benefit for the future, to have a sustainable energy source. If all the scooters would drive electric and would be charged on solar panels on the roofs of the houses, the air pollution would be reduced drastically. An increase of amount of tourists per year from 3 million to 3 times more in a couple of years is crazy for an island that measures only 87x100 km. The local people are very friendly and the food is superb. If they would use sustainable methods combined with traditional living, it could be paradise.
Yes and No. I would never make it my primary destination because it is too crowded. Bali acts as a good jump off point to neighbouring islands Java, Lombok and Sumbawa.
I always plan to return to Indonesia and Bali it´s always the place to stay a few days and goes to another trip trhought Indo. But when I´m with my kids I used to spend more time at Bali because it has more infraestructure and other things to do with the kids.
Aside from the fact that I have an internship lined up there for which I have already interned previously but next time will be for long term (an environmental organization working to keep the ocean clean) Bali is a great place to relax, catch good waves and meet great people. Obviously depening on which part of Bali you stay in...
Because its awesome, the lodging is hella cheap even more so than Mexico, they have monkeys, the architecture is cool because its totally unregulated and mushrooms are legal.
It is still a lovely island with good surf breaks, even though it is quite polluted by waste and has to many surfeäing tourists
my girlfriend is living there, she pregnant, Bali is crowded but still lovely, waves are good, cheap living
I'm planning to go back with my then wife for our honeymoon. We'll also be going to Thailand, Cambodia and Vietnam.
My father is Indonesian. I am a big fan of the food and the waves are awesome. I did not grow up in Indonesia but I have been there many times over the years and seen it changed. The problem is a lot more holistic than just surf. Is the people it attracts is the local policies in development and the business been implemented. It requires a change of community mind frame. Indonesians are heavily influenced by money, it's probably brought by the Chinese culture, but it represents social statuses. Balinese people hate that, putting a monetary quota to surf beaches in Bali would segregate the local people and promote more foreigners to surf it.
Love the island; it's magic, love de local people, the traditional culture, the landscape, nature,surf.. but in ten years the island have changed a lot and there are to much buildings and hotels everywhere
though it has been a while since I was there I loved the culture, the surfbreaks, and the people of Bali. It was beautiful, affordable, and at the time pretty undeveloped outside of Kuta.
love that place, its been about 10 years since I went and I worry its not the same from all the development that occurred but still want to return and get shacked at Padang Padang!

XI. Figures

Figure 1 Hypothetical Evolution of a Tourist Area (Reproduced from Butler (1980, fig. 1))

Figure 2 G-Land [map]. 2016. Scale undetermined; generated by Kristin Pettina; using "Surfline.com". <http://www.surfline.com/surf-report/g-land-indonesia_7194/satellite-view/> (December 03, 2013) (modified)

Figure 3 Bali Topography – "Bali." 8°30'23.99" S and 115°05'30.68" E. Google Earth. April 09, 2013. Accessed November 27, 2013 (modified)

Figure 4 Top Left: Bali Climate Zone [map]. Scale not given. reliefweb <http://reliefweb.int/sites/reliefweb.int/files/resources/OCHA_ ROAP_Koeppen-Geiger_v1_100609.pdf> (November 26, 2013) (modified)
Top Right: https://www.bali.com/news_weather.html (accessed 12/03/13)
Bottom Left: Kuta, Bali Wind Direction - http://www.windfinder.com/windstats/windstatistic_ kuta.htm (accessed 12/10/13)
Bottom Right: Kuta, Bali Wind Data (Windfinder.com)
Kuta, Bali Wind Data - http://www.windfinder.com/windstats/windstatistic_ kuta.htm (accessed 12/10/13)

Figure 5 Aquifer Productivity on Bali [map]. Scale undetermined; generated by Kristin Pettina; using Badan Geologi <http://pag.bgl.esdm.go.id/siat/?q=content/peta-hidrogeologi-indonesia> (November 24, 2013) (modified)

Figure 6 Harvested Area of Bali Yr 2012 (ha) - Authors own, data from Badan Pusat Statistik http://www.bps.go.id/eng/hasil_publikasi/si_2012/index3.php?pub=Statistik%20Indonesia%202012 (accessed 10/18/13), p. 194-209

Figure 7 Population Density on Bali Year 2000 (person/km^2) [map]. 2007. 1:1,500,000. Kepadatan Penduduk Menurut "Basic Grid Square". Sinfonica <http://www.sinfonica.or.jp/international/indonesia_hp/indonesia_pop_density_Jawa-bali.jpg> (December 03, 2013) (modified)

Figure 8 Left: Indonesia Electricity Generation by Type (2011) - http://www.eoearth.org/view/article/51cbedb47896bb431f693544/ (accessed 12/03/13)
Right: Indonesia Coal Production & Consumption (2001-2011) - http://www.eoearth.org/view/article/51cbedb47896bb431f693544/ (accessed 12/03/13)

Figure 9 Bali Waste & Wastewater Facilities [map]. Scale undetermined; generated by Kristin Pettina; using SIGI-PU <http://sigi.pu.go.id/dev/webgis/ck> (November 24, 2013) (modified)

Figure 10 Kuta Development Over 30 Year Span (Reproduced from Pratiwi (2009, fig. 6.2))

Figure 11 Left: Kuta Development in 1965 (Reproduced from Pratiwi (2009, fig. 6.3))
Right: Kuta Development in 1974 (Reproduced from Pratiwi (2009, fig. 6.4))

Figure 12 Top: Rahmi's Kuta Study Area (Reproduced from Rahmi (1992, fig.1.2))
Middle: Land Use in Rahmi's Kuta Study Area (Reproduced from Rahmi (1992, fig.4.2), modified),
Bottom: Building Density in Rahmi's Kuta Study Area (Reproduced from Rahmi (1992, fig.4.5))

Figure 13 Top: Kuta Tourism Master Plan, 1991 (Reproduced from Rahmi (1992, fig.6.1))
Bottom: Designated Tourist Areas on Bali (Reproduced from Dibnah (1992, fig. 1), modified)

Figure 14 Indonesia's Fresh Water Risk [map]. Scale undetermined; generated by Kristin Pettina; using Aqueduct Water Risk Atlas. <http://www.wri.org/our-work/project/aqueduct/aqueduct-atlas> (November 27, 2013) (modified)

Figure 15 Top: Overall Reef Risk (Reproduced from Burke et al. (2012, map 2.2))
Bottom: Reef Risk from Coastal Development (Reproduced from Burke et al. (2012, map 2.3))

Figure 16 Top: Indonesia: Natural Hazard Risk [map]. 2011. Scale not given. OCHA Regional Office for Asia Pacific. Reliefweb <http://reliefweb.int/sites/reliefweb.int/files/resources/map_1297.pdf> (November 25, 2013) (modified)
Bottom: Indonesia Risk for Multiple Hazards [map]. Scale not given. Asia-Pacific: Estimated Risk for Multiple Hazards. Reliefweb <http://reliefweb.int/sites/reliefweb.int/files/resources/map_615.pdf> (November 25, 2013) (modified)

Figure 17 Left: Ground Movement Susceptibility Zones [map]. Scale undetermined; generated by Kristin Pettina; using Badan Geologi <http://www.vsi.esdm.go.id/galeri/index.php/Peta-Zona-Kerentanan-Gerakan-Tanah-01/Peta-Zona-Kerentanan-Gerakan-Tanah/Prov-Bali> (September 06, 2015) (modified)
Right: Bali's Seismic Hazard [map]. 2008. 1:10,000,000. Seismic Hazard of Western Indonesia. USGS <http://earthquake.usgs.gov/hazards/products/images/WIndoSH.pdf> (September 06, 2015) (modified)

Figure 18 Top Left: Tsunami Hazard Probability Risk [map]. 2010. 1:25,000. Tsunami Hazard Map Bali. gitews <http://www.gitews.org/tsunami-kit/en/id_tsunami_hazard_map_bali.html> (November 30, 2013) (modified)
Top Right: Population Density of Kuta [map]. 2010. 1:25,000. Tsunami Risk Map Bali Exposed People. gitews <http://www.gitews.org/tsunami-kit/en/id_tsunami_risk_map_bali.html> (November 30, 2013) (modified)
Bottom Left: Tsunami Evacuation Time of Kuta [map]. 2010. 1:25,000. Tsunami Risk Map Bali Evacuation Time. gitews <http://www.gitews.org/tsunami-kit/en/id_tsunami_risk_map_bali.html> (November 30, 2013) (modified)
Bottom Right: Tsunami Overall Risk for Kuta [map]. 2010. 1:25,000. Tsunami Risk Map Bali Risk Map. Gitews <http://www.gitews.org/tsunami-kit/en/id_tsunami_risk_map_bali.html> (November 30, 2013) (modified)

Figure 19 Tri Angga – Authors own, adapted from Budihardjo (1986, p. 32 - 39)

Figure 20 Major Cosmic Axes – Authors own, adapted from Budihardjo (1986, p. 4)

Figure 21 Top Left: Typical Balinese Village Layout (Reproduced from Budihardjo (1986, fig. 9))
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Bottom: Tri Angga Concept in a Balinese House (Reproduced from Budihardjo (1986, fig. 3))

Figure 22 Top: Waves with Offshore Wind - http://www.surferwaynekelly.com/New_Folder/7540web.jpg (accessed 10/13/13)
Bottom: Waves with Onshore Wind - http://2.bp.blogspot.com/DXvQyAwSHF0/ULQhJ0mnDrI/AAAAAAAANaw/SrhpcuZWelA/s1600/IMAG0772.jpg (accessed 10/13/13)

Figure 23 Refraction (Reproduced from Butt et al. (2005. fig. 6.1)

Figure 24 Bali's Most Popular Surf Spots – Authors own, adapted from Lueras (2002, p. 64-65) and www.surfline.com

Figure 25 Location of Survey - Authors own

Figure 26 Top: Area Context Map (Reproduced from *Bintan Eco Island Indonesia* (2011, p. 10-11, modified))
Bottom: Land Use Plan (Reproduced from *Bintan Eco Island Indonesia* (2011, p. 17, modified))

Figure 27 Top: Plant Cover - Author's own, adapted from *Bintan Eco Island Indonesia* (2011, p. 119)
Bottom: Water Catchment Zone - Author's own, adapted from *Bintan Eco Island Indonesia* (2011)

Figure 28 Top: Land Cover (Vegetation) (Reproduced from *Bintan Eco Island Indonesia* (2011, p. 118)
Bottom: Land Use Zones Hydrology - Author's own, adapted from *Bintan Eco Island Indonesia*

Figure 29 Top: Mangrove - Author's own, adapted from *Bintan Eco Island Indonesia*
Bottom: Currents, Reefs and Tidal Estuaries (Reproduced from *Bintan Eco Island Indonesia* (2011, p. 113, modified))

Figure 30 Top: Map Bintan Island – "Bintan Island" 1°09'50.26"N, 104°19'40.76"E. Google Earth. December 04, 2002. Accessed December 6, 2014.
Bottom: Treasure Bay rendering-
http://www.landmarks.com.my/?cur=gallery/view&id=4&title=Treasure_Bay,_Pesona_Lagoi_Bintan (accessed December 6, 2014)

Figure 31 Local and Global Threats in 2050 to Corals [map]. Scale undetermined; generated by Kristin Pettina; using KML Data Set - Google Earth <http://www.wri.org/resources/data-sets/reefs-risk-revisited> (December 10, 2014)

Figure 32 Land Use Zones - Author's own, adapted from *Bintan Eco Island Indonesia*

Figure 33 Township & Support Facilities / Utilities Zone - Author's own, adapted from *Bintan Eco Island Indonesia*

Figure 34 Map Nusa Island – "Nusa Island Retreat." 2°34'55.80"S and 150 °46'51.86"E. Google Earth. December 13, 2015. Accessed March 13, 2016 (modified)

Figure 35 Top: Map Bingin – "Bingin Beach." $8^0$48'20.59"S and $115^0$06'46.65"E. Google Earth. November 06, 2015. Accessed December 10, 2015
Middle: Bingin Beach Development - Photo by Author
Bottom: Bingin Hillside - Photo by Author

Figure 36 Power Lines & Water Pipes Next to Walkway to Bingin Beach - Photo by Author

Figure 37 Map Bingin – "Bingin Beach." $8^0$48'20.59"S and $115^0$06'46.65"E. Google Earth. November 06, 2015. Accessed December 10, 2015 (modified)

Figure 38 Parti Diagram (author's own)

Figure 39 Site Plan (author's own)

Figure 40 Sun and Wind Diagram (author's own)

Figure 41 Views (author's own)

Figure 42 Map Bali - "PT Bambu Pure to Bingin Beach." $8^0$42'00.65"S and $115^0$09'56.87"E. Google Earth. December 13, 2015. Accessed December 29, 2015

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